WOOD DISTILLATION

Vol. XIII—No. 3 MARCH, 1907 $1.00 a Year; 10 cts. a Copy

FORESTRY & IRRIGATION

1311 G Street, Northwest, Washington, D. C.

The Proceedings

OF THE

American Forest Congress

held at Washington, D. C., have
been published in book form

This volume contains in full the sixty notable addresses and papers delivered at the several sessions of the Congress, including those by President Roosevelt, Secretary Wilson, and Mr. J. J. Jusserand the French Ambassador; also a list of the delegates who were present, and the text of the resolutions adopted.

Altogether it forms the most comprehensive and authoritative publication on the subject of forestry that has yet been issued in the United States.

The price of the book is **$1.00** POSTPAID.

Orders should be accompanied by remittance, and may be sent to

American Forestry Association

1311 G St., N. W., Washington, D. C.

ALFRED K. CHITTENDEN ALLAN B. PATTERSON

CHITTENDEN & PATTERSON

Consulting and Contracting Foresters

524-525 LAW BUILDING, BALTIMORE, MD.

FOREST WORK OF ALL KINDS

Management of timber tracts, forest estates, and woodlands. Timber estimates and maps. Appraisement of forest lands. Adjustment of logging methods. Forest planting.

California, Alta, Placer County

AGASSIZ HALL

is a boys' Preparatory School in the Sierra Nevada Mountains. Its boys are encouraged to ride, row, swim, fish, hunt, trap, snowshoe as out-of-school aids toward developing healthy manhood

Read "Irrigation in the United States," by Frederick Hayes Newell, Chief Engineer U. S. Reclamation Survey. Price, $2, postpaid to any address. Address "*Forestry and Irrigation*," Washington, D. C. .·. .·. .·. .·.

HARVARD UNIVERSITY

The Graduate School of Applied Science and The Lawrence Scientific School

offer graduate and undergraduate courses in Civil, Mechanical, Electrical, Mining and Metallurgical Engineering, Architecture, Landscape Architecture, **Forestry,** Physics, Chemistry, Biology and Geology.

For further information, address W.C. SABINE, 15 University Hall, Cambridge, Mass.

FOR SALE.

Set of Sargent's *Silva* of North America.

Fourteen volumes in original boxes. Cost $350 00 net; offered at $265.00 net. Address W. W. A. care Forestry and Irrigation, Washington, D. C.

R. E. BILLS, President. R. C. WILLIAMSON, Treasurer. C. P. MEBANE, Secretary.

The Lumber Growers' Co.,

(Incorporated)

Capital Stock, $25,000.

Parkersburg, W. Va.

This company has been incorporated to purchase second growth timber lands, and introduce upon them scientific forestry, and also to plant and cultivate the Catalpa. It is probably the first enterprise to engage in this special field. It offers to the public an opportunity to become interested in a company engaged exclusively in forestry, and there has been a ready response to the invitation. At a recent meeting of the directors it was decided to offer more shares for subscription at their par value of $50 each. Persons who wish to have a part in the expanding movement of forest cultivation are invited to invest in this enterprise.

Address all communications to

C. P. MEBANE, Secretary,

Greenville, Pa.

..THE..

AMERICAN FORESTRY ASSOCIATION

President—HON. JAMES WILSON,
Secretary of Agriculture.

The American Forestry Association was organized in 1882, and incorporated in January, 1897. It now has nearly 6,000 members, residents of every State in the Union, Canada, and foreign countries. From its origin it has been the tireless friend of the forests.

The object of the Association is to promote the preservation, by wise use, and the extension of the forests of the United States; its means are agitation and education; it seeks to encourage the application of forestry by private owners to forest holdings, large or small; and it favors, especially, the establishment and multiplication of National and State forests, to be administered in the highest interests of all.

The Association seeks as members all who sympathize with its object and methods, and who believe that our natural resources constitute a common heritage, to be used without abusing and administered for the common good. Seeking to conserve our supplies of wood and water, the Association appeals especially to wood-producers and users, including owners of wood lands, lumbermen, foresters, railroad men, and engineers; and to those dependent upon equable stream flow, as manufacturers, irrigators, employers of water power, and those engaged in internal commerce.

The Association meets annually in Washington. It publishes, monthly, FORESTRY AND IRRIGATION, the magazine of authority in its special field. The list of contributors to this publication includes practically all persons prominent in forest work in the United States, making it alone worth the cost of Annual Membership in the Association.

The dues, covering a subscription to FORESTRY AND IRRIGATION, are as follows: Annual—For Annual Members, $2; for Sustaining Members, $25; Total, with exemption from all other payments—for Life Members, $100; for Patrons, $1,000.

THOMAS ELMER WILL, Secretary.
Address: 1311 G Street, N. W., Washington, D. C.

THE

American Forestry Association

OFFICERS FOR 1907

President

Hon. JAMES WILSON, Secretary of Agriculture

Vice-Presidents-at-Large:

Dr. EDWARD EVERETT HALE
Mr. F. E. WEYERHAEUSER
Mr. JAMES W. PINCHOT
Dr. B. E. FERNOW
Mr. JOHN L. KAUL

Secretary, THOMAS ELMER WILL, Washington, D. C.

Treasurer, OTTO LUEBKERT, Washington, D. C.

Directors

JAMES WILSON	HENRY S. GRAVES	W. W. FINLEY
WILLIAM L. HALL	F. H. NEWELL	GEORGE K. SMITH
GEORGE P. WHITTLESEY	GIFFORD PINCHOT	WILLIAM S. HARVEY
JAMES H. CUTLER	N. J. BACHELDER	H. A. PRESSEY
RUTHERFORD P. HAYES	ALBERT SHAW	GEORGE F. PEABODY

APPLICATION FOR MEMBERSHIP

To THOMAS ELMER WILL,
Secretary American Forestry Association
1311 G St., N.W., Washington, D. C.

Dear Sir: I hereby signify my desire to become a member of the American Forestry Association. Two Dollars ($2.00) for annual dues enclosed herewith.

Very truly yours,

Name_____

P. O. Address_____

For Sale by FORESTRY AND IRRIGATION, 1311 G Street, N. W., Washington, D. C.

IMPORTANT BOOKS ON FORESTRY

PRINCIPLES AND PRACTICE OF FORESTRY

Forest Mensuration. By HENRY SOLON GRAVES, M. A. A complete text book of this important subject and the first written for American Foresters. It deals with the determination of the volume of log, tree, or srand, and with the study of increments and yields. *Price, $4.00*

Economics of Forestry, The. By B. E. FERNOW. This volume treats of forests and forestry from the standpoint of political economy, and is designed to furnish a trustworthy basis for formulating public policy. *Price, $1.50*

First Book of Forestry, A. By FILIBERT ROTH. An outline of the general principles of forestry, written in simple, non-technical language, designed particularly for the beginner. *Price, $1.25*

Practical Forestry, for Beginners in Forestry, Agricultural Students and Woodland Owners. By JOHN GIFFORD. A good general description of the principles of forestry with enough technical information to prepare the beginner. *Price, $1.25*

History of the Lumber Industry of America. By J. E. DEFEBAUGH. The first authoritative work of its kind yet issued, and one which will commend its self alike to the timber owner, lumberman, lumber manufacturer, or merchant, or student of economics. In four volumes bound in half leather *$5.00 per volume.*

Forest Planting. By H. NICHOLAS JARCHOW. An illustrated treatise on methods and means of restoring denuded woodland. *Price, $1.50*

Forestry. (Schwappach.) An English translation of "Forstwissenschaft." *Price, 50c*

Hedges, Windbreaks, Shelters and Live Fences. By E. P. POWELL. A treatise on the planting, growth and management of hedges with information concerning windbreaks and shelters. *Price, 50c.*

North American Forests and Forestry. By ERNEST BRUNCKEN. This volume, expository in its character, is written in a style intended for the general reader, to whom it should convey a good idea of our forests forestry. *Price, $2.00*

Practical Forestry. By ANDREW S. FULLER. A treatise on the propagation, planting and cultivation, with descriptions and the botanical and popular names of all the indigenous trees of the United States, and notes on a large number of the most valuable exotic species. *Price, $1.50*

Principles of American Forestry. By SAMUEL B. GREEN. Prepared especially for students in elementary forestry and for the general reader who wishes to secure a general idea of forestry in North America. *Price, $1.50*

Profession of Forestry, The. By GIFFORD PINCHOT. A pamphlet containing an address on that subject by Mr. Gifford Pinchot; also an address by Mr. Overton W. Price on "Study in Europe for American Forest Students," and a list of reference publications for students. *Price, 25c.*

FOREIGN IMPORTATIONS

English Estate Forestry. By A. C. FORBES. An authoritative volume on English forest methods from the pen of a well known forester, that should prove of interest to Americans. *Price, $3.60*

Forstwissenschaft. (Schwappach.) *Price, 40c*

Manual of Forestry. (Schlich.) Five volumes, complete, or separately as follows (price, complete, $17.20);

Vol. I. **"Utility of Trees and Fundamental Principles of Silviculture."** *Price, $3.40*

Vol. II. **"Formation and Tending of Woods."** *Price, $5.20*

Vol. III. **"Forest Management."** *Price, $5.20*

Vol. IV. **"Forest Protection."** *Price, $3.60*

Vol. V. **"Forest Utilization."** *Price, $4.80*

This is perhaps the most authoritative work that has been issued on the technical side of forestry, translated from the German.

DENDROLOGY, BOTANY, AND IDENTIFICATION OF SPECIES

Manual of the Trees of North America (exclusive of Mexico). By CHARLES SPRAGUE SARGENT. A volume that presents in convenient form and with excellent illustrations, authoritative information concerning the trees of North America. It is written in a manner that enables the reader to readily find what family or species any particular tree belongs. *Price, $6.00.*

American Woods. By ROMEYN B. HOUGH. A new departure in the publication of an authoritative work illustrated with actual wood sections of the various species described. Three are given of each, viz., radial, transverse, and tangential. Issued in ten parts, per part *Price, $5.00*

Among Green Trees. By JULIA ELLEN ROGERS. This book supplies the demand for a nature book on trees which is more than mere systematic studies. The book treats of general principles, etc., and gives tree history and life accurately. *Price, $3.00*

Familiar Trees and Their Leaves. By F. SCHUYLER MATHEWS. This little volume contains a large amount of interesting information concerning the better-known trees of the eastern United States. The botanical name and habitat of each tree is given, along with a record of the precise character and color of its foliage. *Price, $1.75*

Flora of the Northern United States and Canada. By BRITTON and BROWNE. A complete and accurate key to the flora of the region covered. *3 vols. Price, $12.00*

Flora of the Southern States. (Chapman.) This is an excellent key to the flora of the south, complete and accurate in its scope. *Price, $4.00*

Getting Acquainted with the Trees. By J. HORACE MCFARLAND. A handsome volume, copiously illustrated, and with facts accurately presented in an entertaining way. *Price, $1.75*

How Plants Grow. By ASA GRAY. An understanding of the way in which a tree grows is of prime importance to the forester, and the matter here presented is accurate and authoritative. *Price, 85c.*

Manual of Botany. By ASA GRAY. A key to the flora of the northeastern states, and the most authoritative publication of its nature. *Price, $1.62; field edition, $2.00*

Our Native Trees. By HARRIET L. KEELER. A popular key to the trees of the northeastern United States, presented in manner giving easy access to the text. The book is accurate, and as far as possible is written in a style which would make it interesting to the beginner. *Price, $2.00*

Our Northern Shrubs. By HARRIET L. KEELER. This volume is planned on the same lines as the foregoing, and describes the shrubs which are native to the region extending from the Atlantic Ocean to the Mississippi River and from Canada to the northern boundaries of our Southern states. The arrangement is by families and each member is given a popular and scientific description. *Price, $2.00*

Principal Species of Wood; Their Characteristic Properties. By CHARLES HENRY SNOW. No attempt is made to give exhaustive descriptions of species, but the author presents a mass of information designed for the use and instruction of woodworkers, etc., in a popular style. A host of concise information is brought under each head, and the work is a valuable one. *Price, $3.50.*

Studies of Trees in Winter. By ANNE OAKES HUNTINGTON A description of the deciduous trees of northeastern America with keys for their identification in winter, written in a bright, entertaining style, and containing a mass of valuable information. *Price, $2.50*

These books sent prepaid upon receipt of price indicated, by FORESTRY AND IRRIGATION, 1311 G Street, N. W., Washington, D. C.

Important Books on Forestry and Irrigation for sale by FORESTRY AND IRRIGATION
1311 G Street, N. W., Washington, D. C.

Trees of New England. By L. L. DAME and HENRY BROOKS. This book is a small volume which can be easily put in the pocket and carried in the woods, and at the same time is the best guide to the identification of our New England trees of any of the smaller books yet published. *Price, $1.50*

Trees of Northeastern America. (NEWHALL.) A good general check list of the more important trees of the northeastern United States. *Price, $1.75*

Trees and Shrubs. By C. S. SARGENT. The most thorough and authoritative publication yet issued, and a standard work. The matter is issued in parts, of which there are three already published. *Price, per part, $5.00*

Trees, Shrubs and Vines of the Northeastern United States. By H. E. PARKHURST. In this book the author describes the trees, shrubs, and vines of the northeastern United States in a popular way, the book being designed especially for persons who have never studied botany. To these it will appeal as a valuable guide to a familiarity with the salient characteristics of trees, shrubs and vines. *Price, $1.50*

DESCRIPTION OF PARTICULAR SPECIES AND LOCALITIES

Mountains of California, The. By JOHN MUIR. No other person is so well fitted to write of the mountains of California as John Muir, and the volume presented here describes not only the mountains themselves but the trees that clothe them and the wild life which they harbor. *Price, $1.75*

Our National Parks. By JOHN MUIR. If you want to learn about the glaciers, mountain peaks, canyons and great waterfalls of the West; of the habits of animals from the squirrel to the moose; plant life from the big trees to the wild flowers — in fact be brought face with nature's works, this is the book. *Price, $1.75*

IMPORTATIONS

Beautiful Rare Trees and Plants. By the EARL OF ANNESLEY. A description of some of the rarer English trees, shrubs and vines, illustrated copiously. *Price, $12.00*

Forests of Upper India and Their Inhabitants. By THOMAS W. WEBBER. This volume is an account of the author's life in India during the period shortly after 1857. It contains a vivid description of the country, its people, customs, etc., with some description of its forests and timber wealth. *Price, $5.00*

Important Philippine Woods. By Captain GEORGE P. AHERN. This is the only authoritative compilation of the more important woods of the Philippines, with copious illustrations, part of which are in color. Captain Ahern is the head of the Forestry Bureau of the Philippines. *Price, $3.00*

BOOKS ON IRRIGATION AND DRAINAGE

Irrigation in the United States. By F. H. NEWELL. The most authoritative and complete work on the subject which has yet been published, by the head of the Government's irrigation work. *Price, $2.00*

Irrigation Farming. By L. M. WILCOX. A newly revised edition of one of the standard works on irrigation. The principal chapters treat very fully of irrigation, its application, etc., and the volume is profusely illustrated. *Cloth, $2.00*

Irrigation for Farm, Garden and Orchard. By HENRY STEWART. This work is offered to those American farmers and other cultivators of the soil who, from painful experience, can readily appreciate the losses which result from the scarcity of water at critical periods. *Price, $1.00*

Irrigation and Drainage. By F. H. KING. While most of the existing books on these subjects have been written from engineering or legal standpoints, this one presents in a broad yet specific way the fundamental principles which underlie the methods of culture by irrigation and drainage. *Price, $1.50*

Irrigation Institutions. By ELWOOD MEAD. A discussion of the economic and legal questions created by the growth of irrigated agriculture in the West, by the Chief of Irrigation and Drainage Investigations of the Department of Agriculture. *Price, $1.25*

Farm Drainage. By JUDGE FRENCH. The principles, process, and effects of draining land with stones, wood, ditch-plows, open ditches, and especially with tiles; including tables of rainfall, evaporation, filtration, excavation, capacity of pipes, cost and number to the acre. *Price, $1.00*

Land Draining. By MANLY MILES. A handbook for farmers on the principles and practise of draining, giving the results of his extended experience in laying tile drains. *Price, $1.00*

Practical Farm Drainage — Why, When, and How to Tile Drain. By C. G. Elliott The book is a clear exposition of the methods of tile draining, with a discussion of the effects, and much valuable related matter. *Price, $1.00*

Land of Little Rain, The. By MRS. MARY AUSTIN. A nature book of the highest type. The volume is made up of a series of sketches of the human, animal, and plant life found in the region of the Mohave desert, Death Valley, and the Sierras, much of which the average person is likely to consider almost devoid of living things. *Price, $2.00*

IRRIGATION ENGINEERING AND CONSTRUCTIVE WORK

Design and Construction of Dams. By EDWARD WEGMANN. This volume includes an authoritative discussion of the constructive work involved and the principal forms of construction. Masonry, rock-fill and timber dams are discussed extensively. *Price, $5.00*

Improvement of Rivers. By B. F. THOMAS and D. A. WATT. This volume is a treatise on the methods employed for improving streams for open navigation and for navigation by means of locks and dams. *Price, $3.50*

Irrigation Engineering. By HERBERT M WILSON. This is the fourth edition of Mr. Wilson's popular work, and the revision and enlargement which it has undergone, places it at the forefront of text books on the subject for American students. *Price, $4.00*

Engineering for Land Drainage. By C. G. ELLIOTT. A manual for laying out and constructing drains for the improvement of agricultural lands. *Price, $1.50*

Reservoirs for Irrigation, Waterpower, and Domestic Water-supply. By JAMES DIX SCHUYLER. An account of various types of dams and the methods and plans of their construction, together with a discussion of the available water-supply for irrigation in various sections of arid America, distribution, application, and use of water; the rainfall, runoff, and evaporation from reservoirs, and effect of silt, etc. *Price, $5.00*

Water Supply Engineering. By A. PRESCOTT FOLWELL. A treatise on the designing, construction and maintenance of water-supply systems, both city and irrigation. *Price, $4.00*

Water Power. By JOSEPH P. FRIZELL. An outline of the development and application of the energy of flowing water. *Price, $3.00*

These books sent prepaid upon receipt of price indicated, by FORESTRY AND IRRIGATION
1311 G Street, N. W., Washington, D. C

THE SPORTSMEN'S SHOW

of the

New England Forest Fish and Game Association

to be held in

MECHANICS' HALL, BOSTON

March 30 to April 13, 1907

Government Loan Exhibit of Beautiful Transparencies Showing Tree Culture and Forest Growth

---

Biographical Pictures of Logging, Fishing and Hunting. Collections of Live Game, Fish and Birds. Fly Casting Tournament : :

R. E. FOLLETT, Manager, Pierce Bldg., Copley Square, BOSTON

Forestry and Irrigation

THOMAS ELMER WILL, Editor

CONTENTS FOR MARCH, 1907

OPENING OF MAIN TRUCKEE CANAL, NEVADA *Frontispiece*

EDITORIAL 113

- Attack on the Forest Service . . 113
- Failure of the Appalachian Bill . 113
- Practical Lumbering at Yale . 115
- What Members Can Do 115
- Work of the Women's Clubs . . . 116

NEWS AND NOTES: 117

- New York State 117
- The Merritt Resolution 117
- Connecticut 119
- Wisconsin 119
- Minnesota 120
- California 120
- Forest Fire Apprehended in Oregon 154
- Governor Pardee's Address . . . 154
- Washington 154
- Forestry Convention at Fredericton, N. B. 155
- Enos A. Mills's Lectures 155
- Forest Taxation 155
- E. A. Sterling's New Field . . . 155
- Fire in the Wichita Mountains . . 156
- Society of American Foresters . . 156
- Alfred Gaskill in New Jersey . . 157

WOOD DISTILLATION, by H. O. Chute 121

FORESTRY IN MARYLAND, by W. F. Besley 125

PROGRESS OF WOOD PRESERVATION IN 1906, by Carl G. Crawford 132

THE PROGRESS OF FORESTRY IN THE UNITED STATES, by Alfred Gaskill 138

UNCLE SAM AS CEMENT MANUFACTURER . . . 142

HOMES IN NEVADA 144

BY-LAWS OF THE AMERICAN FORESTRY ASSOCIATION WITH MEMBERS AND CORRESPONDENTS . . . 147, 149

NEWS AND NOTES, Continued, See above 154

A NEW CALIFORNIA OAK (Quercus pricei), by George B. Sudworth 157

UNITED STATES FOREST SERVICE 159

UNITED STATES RECLAMATION SERVICE . . . 162

RECENT PUBLICATIONS 166

Canadian Forestry Journal — Pinhole Injury to Girdled Cyress
Hawaii, Division of Forestry

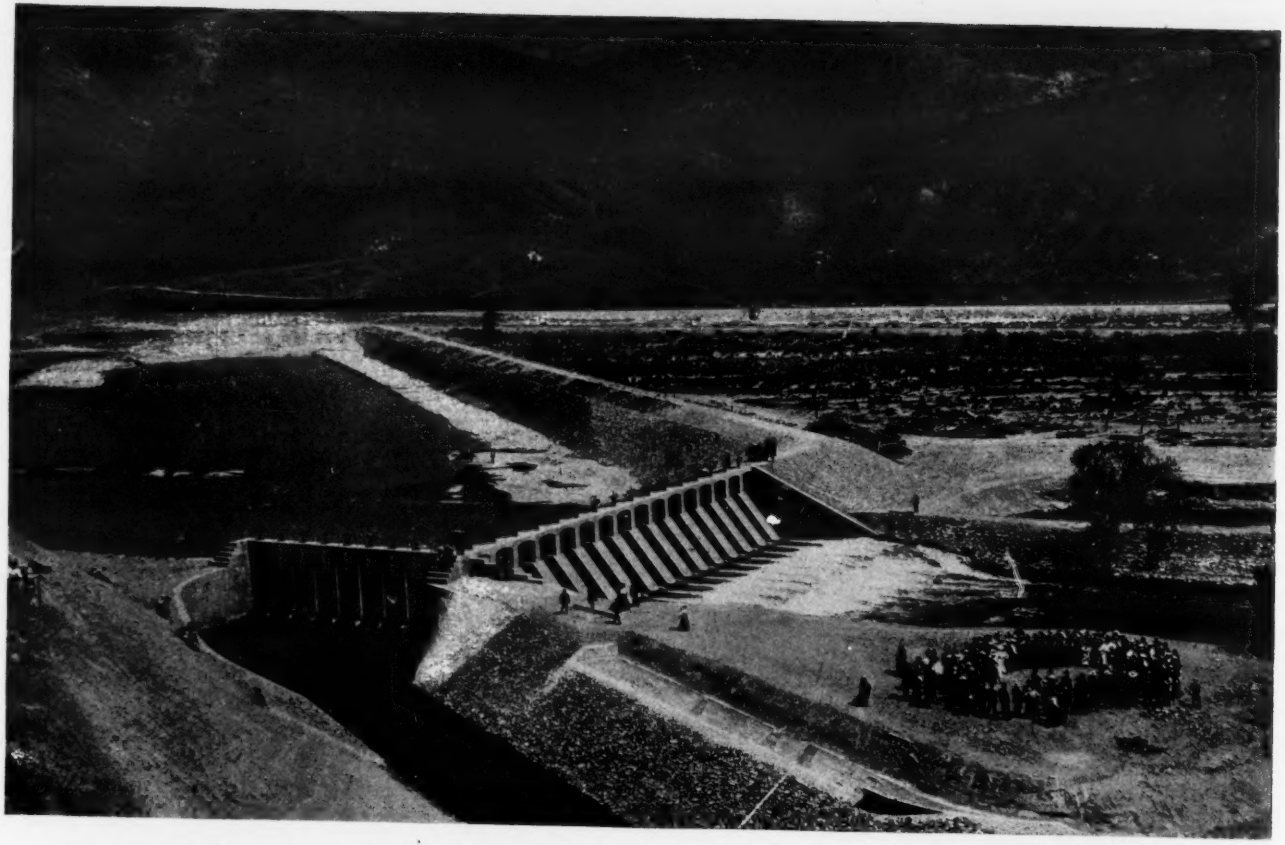
FORESTRY AND IRRIGATION is the official organ of the American Forestry Association Subscription price $1.00 a year; single copies 10 cents. Copyright, 1907, by The American Forestry Association. Entered at the Post Office at Washington D. C., as second-class mail matter.

Published Monthly at

1311 G STREET, N. W.

WASHINGTON, D. C.

JOHN E. SHERIDAN



View of a Great National Irrigation Project. Congressional party gathered in circle during the speaking at the opening of the newly completed headworks of the main Truckee Canal, Nevada.

VOL. XIII. MARCH, 1907 No. 3

EDITORIAL

Attack on the Forest Service

As this issue of FORESTRY AND IRRIGATION goes to press an aggressive fight is raging in the U. S. Senate on the National forest reserve policy.

The contest started as an announced but evidently premeditated attempt to overthrow, by a sudden attack, the entire system of national forests in the United States. Among the questions at issue at different stages of the debate were those of increasing the salary of the Forester from $3,500 to $5,000, of loaning, as recommended by the President, $5,000,000 to the Forest Service for the development and equipment of the national forests, of bringing under control of the Forest Service the great open range, often a battle ground of conflicting interests, of transferring from the control of the Forest Service the proceeds of timber sales and other remunerative activities on the reserves; and, finally and of chief importance, the question itself of maintaining a national forest policy.

At this writing the indications are that the forest reserve policy will not lose materially in any way, but that, instead, it will gain much through the publicity given to it and to the great work of the Forest Service.

The contest raised up some unexpected friends for the Service. Furthermore, the extreme language used by some of its opponents must unquestionably react in its favor. When United States senators in debate employ, for example, such language as this: "The system as now operating is so vicious that anything that would destroy it would be welcome," it is incredible that they shall not, thereby, create sentiment in favor of the object attacked, and lead thoughtful minds seriously to discount whatever else they may say or have said.

In the April issue of FORESTRY AND IRRIGATION a fuller account of this contest will be given, together with a statement as to final results.

Failure of the Appalachian Bill

As the Fifty-ninth Congress draws to a close, it is evident the Appalachian-White Mountain bill, for whose passage such heroic effort has been made, must again fail of passage.

And why?

Patrick Henry said, "It is natural for man to indulge in the illusions of hope." It is perhaps also natural for man to shift responsibility. It is easy to say that this bill failed because of "an autocratic speaker."

It is unquestionable that in the House of Representatives of to-day the Speaker holds vast power. It is also true that this power has not been cast on the side of the Appalachian bill.

Blaming individuals, however, does not write legislation on the national statute book. Furthermore, as the Speaker declared to the committee of governors, "there are others" in the House than he.

Not only so, but there are others in the country. One lesson we need to learn and never forget: Whatever be the attitude of a congress, a committee, or an officer in a republic, what the people actually want they can get.

Legislative mills grind slowly, and often heavily; but the people, if they but will, can make them grind. Instances might be cited in which, within recent years, legislation which seemed absolutely unattainable has been passed. Why? Because a demand, unmistakable and emphatic, poured in from the constituencies.

A sudden change of wind may transform winter into summer. Similarly, a breeze from the ocean from which power holders of every class and grade in our common country hold their state, the great American people, may change the climate of legislative halls and make easy what, before, seemed impossible.

A republic is a government not from the top down but from the bottom up. If we would pass this bill we must begin at the bottom.

The workmen who wrought with Nehemiah repaired "every man over against his house." They were scientific and practical and they *rebuilt the desolated city.*

We must follow their example. Friends of this bill must organize *at home,* and begin work *at home.*

And we must not be afraid of small things. Mass meetings and brass bands are good, but they are not always available, and great things may be done without them.

One resolute man or woman in any community can permeate that community with forestry sentiment. Let him find or make another friend of the bill; then let these two find a third who will co-operate with them. Now let these three join the American Forestry Association, receive membership cards as credentials, and constitute themselves the local Forestry Association of their neighborhood, one of them to act for one year as President, and another as Secretary. Let them apply to the National Office for literature—back numbers of FORESTRY AND IRRIGATION bearing on the Appalachian bill will cost them only the postage of 1 cent per copy. A systematic canvass should next be made for converts. A meeting should be announced, perhaps at the home of a member, at the schoolhouse or some other convenient place; one of the members should prepare himself to present the case for the Appalachian bill; literature should be distributed, new members enlisted and their applications for membership in the American Forestry Association taken and sent, together with their dues, by the Secretary to the National Office.

Regular meetings of this Association should be held; the literature of forestry carefully studied, and new members assiduously sought. The papers should not be overlooked. They want news. The local Forestry Association should make news through its meetings and agitation, and should furnish reports to the local press. Don't wait for the papers to find you; find them; interest them, if they are not already interested, and use their mighty leverage in building the cause in your neighborhood. Keep in close touch with the National Office; it will gladly aid all such efforts, and FORESTRY AND IRRIGATION will, when informed, report results.

Don't wait for something to begin; make it begin. Don't wait for a crowd to get interested; get the crowd interested by interesting the few. All great things have small beginnings. One person can start this movement in any neighborhood, and unless one person starts it, it will not start.

Now let all set to work to make sentiment for the Appalachian bill, and by next December a pressure can be brought to bear upon Congress which will be irresistible.

Practical Lumbering at Yale

The effort of the National Lumber Manufacturers' Association to provide for a course of practical lumbering at the Yale Forest School is bearing good fruit; and early this month the entire senior class, as announced in the January issue, went to Grandin, Mo., to spend the remainder of the school year, about three and one-half months, in studying the logging and milling operations on a large shortleaf pine tract. It is the aim of those in charge of the work to make it of the most practical nature throughout, and by requiring the students to solve problems on the ground to fit them in the best possible manner for the duties which will be theirs when they leave school and assume the responsibilities of professional foresters.

For this purpose the students will be instructed in timber estimating, in plans of lumbering, logging methods, including railroad construction, sawmill operations, grading and handling lumber on the yard, and office management. In other words, the attempt will be made to give as clear an idea as possible of the whole course of operation from the tree to the consumer, and, what is more important, to make the instructions of permanent value by requiring the students to learn by doing. It is unnecessary to point out that this is a decided step in advance for the Yale Forest School, and means that the instruction in lumbering has been transferred from the class-room, where it formerly was, to the field where it most properly should be.

There is great need, both in Government and private forest work, for men who combine the technical training of the forester with the practical knowledge of the lumberman. It is not pretended that a little more than three months in the woods will turn a college boy into an expert lumberman, but it will give him such a general understanding of the principles involved that he can apply them to his own problems later, and this will be a great gain over previous instruction.

What Members Can Do

Following is one of the most interesting letters ever received by this office:

"Executive Office
BAUSCH & LOMB OPTICAL CO.,
Rochester, N. Y., U. S. A.
February 9, 1907.

Thos. E. Will, Sect'y The American Forestry Association, No. 1311 G Street, N. W., Washington, D. C.:

Dear Sir:

Enclosed please find check for $18.00 covering the annual dues for the following: J. J. Bausch, $2.00; H. Lomb, $2.00; Edward Bausch, $2.00; Carl F. Lomb, $2.00; Henry Bausch, $2.00; William Bausch, $2.00; William Drescher, $2.00; Adolph Lomb, $2.00; Henry C. Lomb, $2.00.

Yours truly,

Kindly acknowledge receipt and oblige

BAUSCH & LOMB OPTICAL CO.,
E. BAUSCH."

Other mails have brought applications for Sustaining Membership accompanied by dues checks of $25.00 each, applications for Life Membership likewise accompanied by checks, this time for $100 each, and single contributions ranging from $25 to $100 each. The above letter, however, is in some respects more noteworthy. It suggests a possibility.

As the annual report of the Board of Directors shows (January issue, page 18) much of the effort and income of the Association are spent in building up the membership. It is the belief of the office that this situation

should be changed. The membership should be pushed by the members themselves, and the energy and funds of the office should be left free for use directly in the work of forestry agitation and education culminating in legislation.

It is easy to indicate what might be done; but deeds are vastly better than words, and an ounce of demonstration is worth a ton of theory. Messrs. Bausch and Lomb have furnished the demonstration.

What this firm have done, other firms can do. What is simpler? And why, if interested, should they not?

A similar line of activity is open to individuals. Interested persons secure subscriptions for papers. Where the *esprit de corps* exists clubs are poured in upon publishers. Why should not an Association, such as the American Forestry Association, with a cause so noble and so vital, be possessed with a similar *esprit de corps* and fired with a like enthusiasm and energy? Given these, and the work of forestry in the United States will receive an impetus which it has never known before. Shall we not have them?

Work of the Women's Clubs

The General Federation of Women's Clubs, through its Committee on Forestry, is attacking the forestry problem with vigor. Mention was made in our last issue (page 62) of the work of the chairman, Mrs. Peterson, in increasing the interest and activity of the State forestry committeemen. Her hope is that, during her administration, work done may be along more universally definite and practical lines. She has recently sent to these committeemen a letter, from which the following is an abstract:

To All Club Women:

* * * Every State in the Union, whether heavily wooded or destitute of trees, should have intelligent forestry laws providing for a due proportion of forest area.

This is a field of usefulness in which women may wisely exert themselves for the welfare of the Nation and of their own States, by spreading information and shaping public sentiment. The formulation of a State policy requires expert knowledge of forest conditions, which can be obtained without expense from the Forest Service at Washington, which co-operates with States seeking its aid in defining and executing such a policy, and its advice should be sought by State Federations. Further information regarding the scope, methods and value of this department may be obtained by sending to the Forest Service, Washington, D. C., for circulars 35 and 36, and by correspondence.

At all forestry meetings there should be a definite presentation of this most vital subject. * * *

An address by some one qualified to treat the subject authoritatively is of great value, and through the generosity and co-operation of the Forest Service this need will to a large extent be met. Enos A. Mills, of Colorado, and other good speakers will talk before teachers, schools and women's clubs. * * *

The American Forestry Association, with five thousand members, has offered to publish in its monthly, entitled FORESTRY AND IRRIGATION, reports of the work the Women's Clubs are doing in the line of forestry. With these two National organizations to direct and aid, it behooves us to accomplish large and permanent results. * * *

Cordially yours,

MRS. P. S. PETERSON.

NEWS AND NOTES

New York State

The *Albany Journal* of February 6 said:

"The new Forest Land Purchasing Board has organized preparatory to resuming the work of buying Adirondack and Catskill lands. * * * The board will probably ask the Legislature for a large appropriation this session to be used in extending the area of the forest preserve."

The *Ithaca* (N. Y.) *News* of February 8 reported a meeting of the City Improvement Society on February 4, and added:

"The most important action taken at the meeting was when the society voted to make a decided stand for the saving of the elm trees of the city, as well as all other shrubbery planted for the beautifying of Ithaca, from the insect pests."

The *New York Tribune* of February 9 published a dispatch from Catskill, N. Y., stating:

"A sale was made here to-day of 3,500 acres of land on Eastkill Mountain, near Black Dome, to Gilbert Colgate, the soap manufacturer, and Alfred L. Manierre, of the law firm of Manierre & Manierre, New York City. This sale takes in the most beautiful and picturesque part of the mountain in that section. It is said that this will be made into a large park and controlled by a number of wealthy New Yorkers, who will stock the many streams with fish. A large game preserve will also be made."

State Forester A. Knechtel, of New York, gave an illustrated talk on forestry at the Central Y. M. C. A. of Buffalo, on February 5. The *Express* said:

"In an informal way he told all about how the State Forestry Commission works to preserve the forest lands and to replant the districts laid waste by fire."

The Merritt Resolution

Great interest is developed in New York State over the so-called "Merritt resolution," providing for a constitutional amendment which would permit private interests to enter the State forests and construct dams for the storage of water. Those favoring the resolution point to the vast water powers which might, in this way, be utilized. Their critics, on the other hand, declare that this is but another of the many attempts which, during the last decade, have been made by interested parties to invade the State forests, that it would result in disastrous flooding of the forest lands, the development of disease-breeding odors from exposed muck, the destruction of much mountain area for public playground purposes, and of streams as homes for brook trout, and that it should be resisted to the end.

The measure has already been approved by the State Legislature at one session; to become a part of the Constitution it must again be approved at the present session and, in addition, by a majority of the voters of the State on a referendum vote.

The press of the State seems almost unanimous against the resolution. Following are some typical expressions of opinion on the subject:

The People's Institute of New York City on January 30 passed the following resolution:

"*Resolved*, That the institute respectfully petitions His Excellency the Governor to request the Legislature to authorize him to appoint a commission to inquire how far the existing constitutional provisions for safeguarding the forests are carried out and what further steps should be taken to preserve the forests for the permanent good of the people."

The New York Chamber of Commerce, on February 8, passed the following resolution:

"*Resolved,* That the Chamber of Commerce of the State of New York hereby emphatically protests against the passage of said resolution as inimical to the public welfare of the State."

Mr. Jos. H. Choate, speaking before the Chamber of Commerce, said:

"Nothing seems to satisfy the private greed that wants to get lumber and water at the State's expense. These private interests have been striving since 1896 to get into the forests. There is a vast deal of water power there and these men are anxious to get at it."

The attitude of the Governor on this measure has been awaited with deep interest. On January 29 he made the following declaration:

"I think I have made it clear that I have a strong conviction of the absolute necessity of the preservation of the State forests. They should not be surrendered in whole or in part to any private interest."

Commenting on this expression, the *Binghamton Republican* of January 31, said:

"Governor Hughes has cast his great influence in favor of preserving the Adirondack forest as it is. He believes that the State should not part with a foot of its wild land, but should add to it as rapidly as it is convenient and possible. He puts his foot down hard upon the movement of the lumber and paper trust for constitutional permission to erect power dams, and flood the land in the valleys of the streams."

Stating that the Governor inclines to side with the view of the Chamber of Commerce of New York City that "the water power that could be stored in the Adirondacks will be worth from $15,000,000 to $18,000,000 a year, and can be made to yield that if the dams are built by the State," The *Republican* added:

"The State will have occasion before many years to use a vast amount of electrical power upon the Erie canal. While it owns the streams to produce that power, it would be better to retain the ownership than to allow land grabbers to walk away with it."

The *New York American* of February 8 refers to the Merritt amendment as an attempt of the pulp wood combine to "amend the constitution so that it may grab off a million or so of acres from the Adirondack forest preserves," and denounces it as " a brazen steal."

The *New York Journal of Commerce,* discussing the resolution, said:

"It seems to be plain that the effort to secure an amendment to the State constitution in relation to the forest preserve in the Adirondacks which would permit private interests to construct dams for the storage of waters, is designed primarily for the benefit and profit of those interests. It is a general belief that this would result in injury to the State forest lands by the backing up of waters and overflowing increased areas and by interference with the legitimate use of the preserve as a health and pleasure resort. Whether so much harm would be done as is apprehended or not the mere fact that this is a scheme for private profit at public expense is enough to condemn it. Under the pretense of preventing destructive floods, maintaining water supply and conserving public interests the real object is to secure free water power for sawmills, pulp mills and other manufacturing purposes.

"There is no reason why in a plan for water storage in the Adirondack region for legitimate public purposes the incidental water power created should not be utilized under proper regulation. There is no occasion for having it created to go to waste, but the plans for accomplishing this should be under State control and regulation and the primary profit from the use of a natural resource of the kind should accrue to the State. The State Water Supply Commission has just sent its first annual report to the Legislature, and it declares its conviction that it is 'practicable to build storage reservoirs on streams and at places that will not conflict with the provisions of the constitution for the protection of the State forest preserves, which will regulate the flow of such streams and thus carry

out the law for protecting the public health and safety.'"

Connecticut

Speaking of "a good work begun" by Connecticut, the *Providence News-Democrat* of February 6 said:

"It began in a modest way by purchasing a stretch of waste land in Windsor and setting out seedlings, the majority of which were pines.

"Since then other plantations have been established, generally through the purchase of abandoned farms, while private enterprise has also been interested in the planting of trees.

"Connecticut's forestry scheme was entered upon in 1901, so that the work can be said to be little more than begun, but the beginning is a most promising one. A few days ago at a meeting of the State Forestry Association, Governor Woodruff gave his approval to a plan for the establishment of a small forest reserve in every township.

"It is the aim of this association to promote forestry in two ways—by establishing reserves and by aiding landowners in the practice of forestry."

In the Fourth Annual Report of the Society for the Protection of New Hampshire Forests appears the statement:

"Connecticut has led not only Massachusetts and Rhode Island in securing the services of a technically trained State Forester, but also entire New England in her admirable fire law. Connecticut was the first New England State to establish a State forest reserve."

At a recent meeting of the State Forestry Association in New Haven, Governor Woodruff said:

"Forestry appeals to me as a straight business proposition. It is an investment and evidently a good one. It has always seemed to me that there is no better investment, from the point of view of the city, the town or the State, than to purchase the cheap land of the State and put it to good use in raising a crop of timber which will be of real use and profit to generations not far distant.

"No one will grasp the idea of forestry quicker than the farmers when once you have presented it to them as a profitable business proposition."

Wisconsin

Mr. Edward M. Griffith, State Forester for Wisconsin, delivered an address in Milwaukee January 25, under the auspices of the school board, on "Practical Forestry in Wisconsin." He said:

"The main forest reserves will be located in Oneida, Vilas, and Iron counties, in the heart of the beautiful northern lake region, which is the most important watershed in Wisconsin and the source of the Wisconsin and Chippewa rivers. The utilization of the water powers of Wisconsin is in its infancy, and the State must see to it that this great watershed is protected so that the amount of water carried by the streams, which means power, may be as nearly as possible uniform throughout the year."

State Forester Griffiths, of Wisconsin, in his annual report to the State Board of Forestry, says:

"The destruction of the forests of northern Wisconsin has been on a tremendous scale, particularly on the headwaters of the Wisconsin river, and the State should gradually acquire forest reserve large enough to adequately protect the watershed of this, our greatest river, as a considerable part of the prosperity of the State is dependent upon its constant, even flow. The tremendous influence which the forest has in preserving and regulating stream flow is the most important factor in the forestry work of Wisconsin. A large enough forest reserve will be able in time to supply many of the important industries which are dependent upon the forests for their raw material.

"The great value of forests in regulating the water supply of the country was recognized by Congress when it passed Senator LaFollette's bill granting to Wisconsin 20,000 acres of land, north of town 33, as an addition to the State forest reserves. In the discussion before the House the point was emphasized that as Wisconsin was cre-

ating forest reserves at the headwaters of the Wisconsin, Chippewa and St. Croix rivers, all of which are important tributaries to the Mississippi, it was assisting in lessening the annual flood damage on that river caused by the rapid destruction of the forests along its course."

Minnesota

State Senator J. M. Hackney, of Minnesota, has introduced a bill for the preservation in its original dimensions of the Minnesota forest reserve at Cass Lake. The *Pioneer Press* expresses the opinion that the presentation of this bill "marks probably the last effort which will be made by the National Forest Service for the establishment of a forest reserve in Minnesota."

The State Forestry Board of Minnesota desires an annual appropriation of $25,000, to be applied to the purchase of land for forestry purposes.

State Senator Dunn, of Minnesota, has introduced a bill (S. F. 107) proposing an amendment to the constitution, and containing the following clause:

"Provided further, that laws may be enacted exempting lands from taxation for the purpose of encouraging and promoting the planting and cultivation of useful trees thereon."

The St. Paul *Pioneer Press* characterizes the proposed amendment as "an ideal one."

The State Forestry Board of Minnesota held its annual meeting January 30, and elected officers as follows: "President, S. M. Owens; vice-president, Frederick Weyerhauser; secretary, Gen. C. C. Andrews; executive committee, John Lind, Prof. S. B. Green and Gen. C. C. Andrews."

The *Winona Independent* of February 2 states:

"The board discussed various bills which were before the Legislature. The plan to establish a school of forestry at the State university was unanimously approved. Another bill, providing for the placing of Itasca Park under the supervision of the commission, was also approved."

Calfiornia

The *San Francisco Bulletin* for January 28 contains the following:

"The State of California, which has within its borders over 28,000,000 acres of forest, is taking steps permanently to preserve practically the whole amount. California's forests are looked upon not only as a great wood supply; they are far more valuable as a medium of water conservation."

The *San Francisco Chronicle* for January 23 said:

"Experiments recently conducted by Professor Loren E. Hunt, of the civil engineering department of the University and head of the forestry station here, have proved that the common eucalyptus trees of this State can be successfully used to take the place of hard woods, that are becoming more scarce in this State each year."

The *San Bernardino* (Cal.) *Index* of January 26 reported that at a meeting held on the preceding evening, the Board of Trade of that city endorsed the proposition to have the school children plant young trees in the foothills. The paper suggests that children clip and send to the Forest Service the following letter:

"Agricultural Department, Washington, D. C., Forestry Bureau:

"Sirs: I request a few seeds of forest trees for propagation and planting in the San Bernardino forest reserve. I am a pupil in the public schools of this city. It is my desire to aid your department in the renewal and extension of the forests on our denuded areas of the forest reserve.

"I agree properly to plant and care for these seed and later plant at my personal expense, under the direction of your officers, the trees grown from them. In this way my effort and your supplies will not be misdirected.

"The following varieties have been recommended, and if obtainable, will be satisfactory: White Cedar, White Fir, Big Cone Spruce, Knob Pine, Attenuata, Eucalyptus.

"Yours respectfully,

.....

"San Bernardino, Cal."

(Continued on page 154)

WOOD DISTILLATION*

How So-called "Destructive" Methods may be made an Important Factor in Wood Preservation

BY

H. O. CHUTE

IN THE CONSERVATION of the forest one of the necessary conditions is that those portions which are taken must be used as economically as possible, and that all parts of the timber which is cut should be made into useful products.

In the manufacture of lumber it is not possible to utilize all parts of the tree. In fact, the major portion is not of suitable shape to be profitably sawed. But as the value of chemical products bears no relation to the shape of the crude materials from which they are made, it is possible in many cases to utilize the refuse from lumbering operations in producing chemical products. One of the most important chemical industries using forest products as raw material is that of wood distillation. Distillation of wood consists in heating wood out of contact with air so that charcoal is produced. From the smoke developed and condensed in this process some important chemical products are made. A cord of hardwood under the best methods of distillation produces ten gallons of wood alcohol, now selling at 40 cents per gallon, and 220 pounds of acetate of lime, worth $2.40 per hundred.

There are two main divisions or classes of apparatus and processes in common use; the first known as the kiln process, where the ordinary beehive brick or stone kiln is used for carbonizing and producing charcoal. This kiln has wooden flues through which the smoke is drawn for the manufacture of chemicals. The primary object of this process is to produce charcoal, and it is used extensively by the producers of charcoal iron. The second method of wood distillation consists in heating the wood in iron retorts from which the air is entirely excluded. The latter process is used by those who primarily intend to produce the chemicals, although it is also used where large amounts of charcoal are required. The kiln process has the advantage of using a coarser grade of wood and being cheap to install and operate. Its product of charcoal is satisfactory, but the yield of chemicals is only one-half that of the retort process. It would be outside the scope of this article to describe the process of recovering the chemicals from the condensed smoke, but it is about the same in both processes.

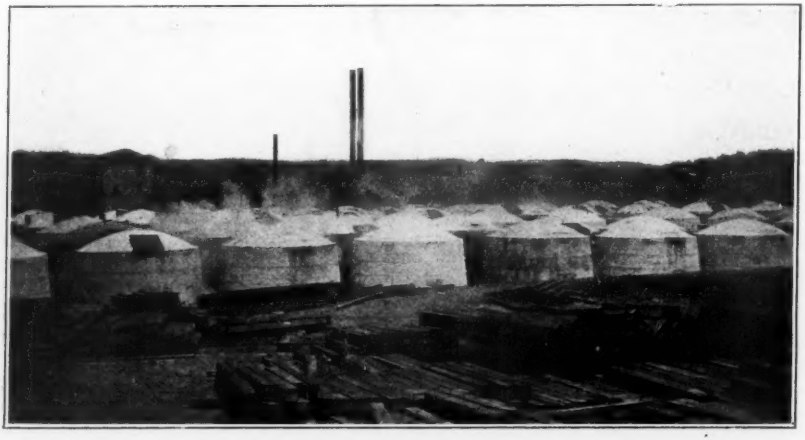
The industry of hardwood distillation has attained large proportions in recent years. Our annual product is about 8,000,000 gallons of wood alcohol and over 60,000 tons of acetate of lime yearly. There are over one hundred and twenty separate plants engaged in this industry, and our exports of these chemicals are large.

While this industry has in the past been conducted independently of lumbering operations, and the forest denuded solely for the purpose of distillation, yet the modern tendency is to engage in this work in connection with

*The writer of this article is a chemical engineer who has made a specialty of wood distillation. He has been for many years engaged in the erection and operation of plants both in this country and in Canada, and is familiar with all the processes used for distilling both hard and soft woods.

ordinary lumbering operations. This plan has many advantages, both from an economical point and from the standpoint of forest preservation. When the industry is conducted in connection with lumbering all the timber which will either make lumber or can be utilized for distillation is removed from the land at one time, and as this process removes all the "slash"—the limbs and rougher logs which have hitherto encumbered the land and promoted subsequent forest fires—there is a better chance for reforestation. While few or none of the lumbermen working on private lands have heretofore paid any attention to the subject of reforesting, it is becoming a consideration of importance, and before long distillation of the waste woods will become a necessity. The use of waste woods for this purpose of course protects an equivalent amount of forest which would otherwise be destroyed. The demand for the chemicals is constant and by utilizing waste products for their production the total forest resources are conserved.

As an illustration of the best development of this industry and as showing the advantages of combining lumbering operations with distillation one of the pictures shows a combined sawmill and chemical plant where wood distillation is carried on. In this case there is a large sawmill which has several years' supply of hardwood, mostly maple and beech, an extensive railway system, and complete organization for handling the timber and converting it into flooring. Next to it stands the chemical works building and beyond that the retort house. The chemical plant was constructed contiguous to the sawmill so that the large amount of refuse bark, sawdust and other waste might be utilized in generating steam for the chemical plant. All the refuse produced in the mill which was formerly thrown into the burner is now used under boilers for the production of steam, and with very little added cost. The mill cuts about 70,000 feet per day, and it is found that about 70 cords of wood suitable for distillation are produced at the same time. That is, in addition to the logs for producing 1,000 feet of lumber, the forest produces about a cord of wood not suitable for sawing. All logs are cut and handled alike before arriving at the mill, no matter what the quality, but on arrival at the mill the logs which would not produce good lumber are sawed into cordwood. All the limbs and other



Charcoal Kiln—Plant of the Sligo Iron Co., Sligo, Mo.

parts which cannot be converted into logs are cut into cordwood in the woods. In addition to this all of the better slabs and edgings are cut into cordwood lengths and these three classes furnish the wood which is carbonized. In the immediate neighborhood of this mill the industry has spread till there are now nearly 300 cords of wood carbonized daily, all of which is the by-product of lumbering operations. Then there followed the production of a large amount of charcoal, and that necessitated the erection of a charcoal blast-furnace to consume the product. The final economical result of this combination of industries is the operation of a furnace producing about 120 tons of iron per day without necessitating the denudation of an acre of ground for its fuel. If a furnace of this size depended on cutting timber for fuel use alone, it would require the stripping of ten acres of forest per day. It can thus be seen that in twenty years it would denude 112 square miles.

Saw Mill, Retort House and Chemical Works, Cummer & Diggins, Cadillac, Wis.

While the hardwood distillation industry is so well developed that of soft woods has progressed less far, though there have been many attempts to distil the soft woods of the South, particularly the "lightwood" of the Southern pine or turpentine pine, in order to obtain the turpentine and other valuable oils.

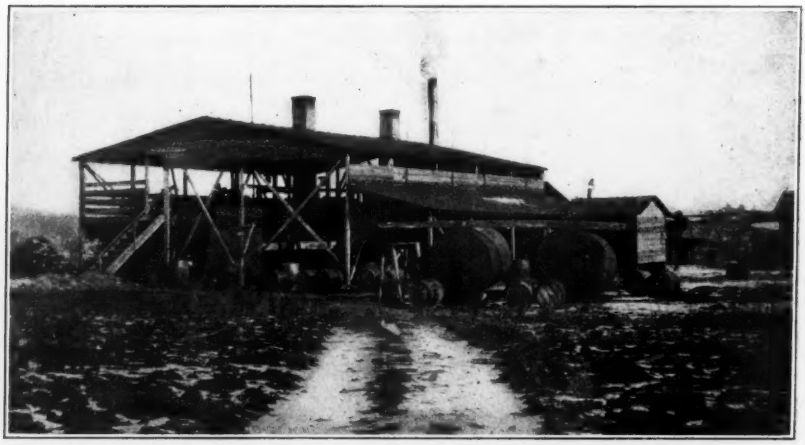
The entire belt in which the Southern longleaf pine grows is more or less covered with lightwood. In many cases this lightwood is the result of turpentining operations. The old methods weakened the trees, the winds blew them down, and the weather soon decayed the sapwood, while the heartwood, being very resinous, resists atmospheric influences. The heartwood therefore contains a concentrated product in which the resinous bodies are said to exist in larger quantities than in the pine tree as it stands. This product is used widely in the South as a fuel for locomotives on the newer sections of track and makes an excellent fuel, but as turpentining operations extend there is constantly produced more of this product.

Owing to the exhaustion of the forests, or turpentine orchards, turpentine of late years has advanced in price greatly and many attempts to produce turpentine by distilling this wood have been made. Most of the attempts have been made by those having experience in turpentining and not by those having experience in wood distillation as conducted on the northern hardwoods. Therefore most projects have met with

failure. Many attempts have been made to extract the turpentine with steam but none have proved profitable. The writer experimented with this method on a commercial scale and obtained only nine gallons of oil per cord of average lightwood. Of this nine gallons only five were true turpentine. This turpentine is perfectly satisfactory, but the amount of product obtained does not pay for the wood and labor of obtaining the oil. The residual wood is, of course, pulverized and moist from contact with the steam, is not good fuel, and is worthless for anything else.

With hardwood methods or "destructive" distillation, however, the writer obtained from one cord of "fat" lightwood 150 gallons of watery acid and 119 gallons of oils and tar. The acid contained four gallons of wood alcohol and an equivalent of 100 pounds of acetate of lime. The charcoal produced amounted to about 500 pounds or 25 bushels. Of the oils there were contained 16 gallons of turpentine of a quality closely resembling "Russian" turpentine as produced in Europe. And there were also 48 gallons of rosin oils and the residue was a creosote and a hard tar.

None of the plants in the South, with possibly one exception, attempt the utilization of the acid liquor, and few have any suitable apparatus. Unless careful rectification and chemical treatment is used the wood turpentine is contaminated with pyroligneous products which have an offensive odor and affect the eyes of the users. These impurities have been eliminated from the wood alcohol by the hardwood distillers and might be eliminated from the wood turpentine. Most of the factories are small, however, and it is not considered possible to afford the expert chemical labor which is necessary to this work. The raw material as found in the South—that is the lightwood—if removed from the ground would materially benefit it from the point of view of forest preservation. Being resinous, it burns fiercely, and in many cases holds a fire even after a severe rain, until the forest is again dry enough to permit the fire once more to progress. Of course, the stumps are even richer than the lightwood, but are awkward to remove and handle. They are worth probably thirty per cent more than equal quantities of lightwood. If it were possible to utilize this lightwood for the purpose



McKethan Plant at Fayetteville, N. C.

of producing turpentine it would tend to displace the gum turpentine obtained by chipping, and so require the cutting of fewer trees for its production. This, in turn, would tend to forest preservation.

While "destructive" distillation has a disagreeable sound to those interested in forestry, it is here attempted to show that by properly conducting the operations, forest preservation is actually promoted.

FORESTRY IN MARYLAND*

BY

W. F. BESLEY

State Forester, Baltimore

WHEN the first settlers came to Maryland they found almost the entire country covered with forests, which had remained untouched through centuries. To make way for homes in the wilderness, and for 200 years the work of destruction continued. The time came, however, when all of the good plow land was cleared; then, indeed, it was found that

Cleared land returning to forest, Allegany Co., Md.

agriculture, the foundation for civilization and progress, the forest had to be subdued with ax and fire. This attack upon the forests grew more intense as new settlers came to carve out the thing had been overdone, for some of the cleared land proved unfit for agriculture, and was allowed to grow up in woods again. As the grown-up fields and abandoned log houses in

* Read before Maryland State Horticultural Society, December 5, 1906.

Virgin forest of oak and hemlock in Western Md.

Cut and culled forest, Garrett Co., Md.

some parts of the State attest, this clearing of non-agricultural land reduced hundreds of families to poverty and forced them to seek a living elsewhere. It also shows that a large part of the area of the State is suitable only for tree growth, and that to pervert it to any other use must inevitably lead to disaster.

Other changes have resulted. The early settler built his cabin of logs that he cut in clearing the land, and the timber for which he had no immediate use was burned. When settlements were founded later a large quantity of building material was needed, and a system of culling over the forests that were convenient to supply this demand was thereupon introduced. The saw mills were moved from one tract of woodland to another until now all of the good saw timber in the State has been cut over at least once. The lumbering operations leave the ground covered with tree tops and brush—the fuel for the destructive fires that so frequently follow the saw mill and help further to impoverish the already crippled forest. Under these extravagant and wasteful methods, inherited from times when timber was overabundant, cutting has been so severe as to imperil the local timber supply. It is safe to say that the productive capacity of woodlands is to-day little more than half what it might be under a correct system of management.

The experience of Maryland is not unlike that of all the Eastern States; indeed, it is a repetition of what was taking place in Europe about 600 years ago. Our natural resources are not fully appreciated until exhausted, or until a sufficient scarcity is created to raise their cost to the point where we begin to feel it. The price of lumber has steadily advanced, especially in the higher grades, to almost double what it was ten years ago. This has caused the thoughtful to reflect, and as the question has engaged more attention the remedies suggested have been more favorably received. In 1900 the State Geological Survey, in co-operation with the Federal Forest Bureau, began a study of the forest conditions of the State. This was in the nature of an economic survey to show the relation that forests bear to other natural resources as well as their value to the State.

It has been apparent for some time that the forest interests of Maryland and the perpetuation of the local timber supply demanded State legislation to make the work effective. In this connection, your own society, as much as three years ago, by a resolution, recommended the enactment of certain laws for the protection and improvement of forest lands. While this resolution failed to receive the attention it deserved at Annapolis, an interest was awakened that made successive steps in securing forest legislation more certain. Last winter a forestry bill was introduced by a member of your society and passed by the legislature. The new law is an excellent beginning in forestry legislation, and it is believed that with the support of the friends of forestry in the State much may be accomplished. Under the law a State Board of Forestry was created, which board had elected a State forester. The State forester is charged with the duty of carrying out the provisions of the law and of promoting all forest interests in the State.

The work has been organized along the following lines:

1. Ascertaining the forest resources and forest needs of the State;
2. Bringing practical forestry to the attention of the people;
3. Co-operating with owners of woodlands and introducing systematic management;
4. Establishing State reserves;
5. Inaugurating a forest warden system.

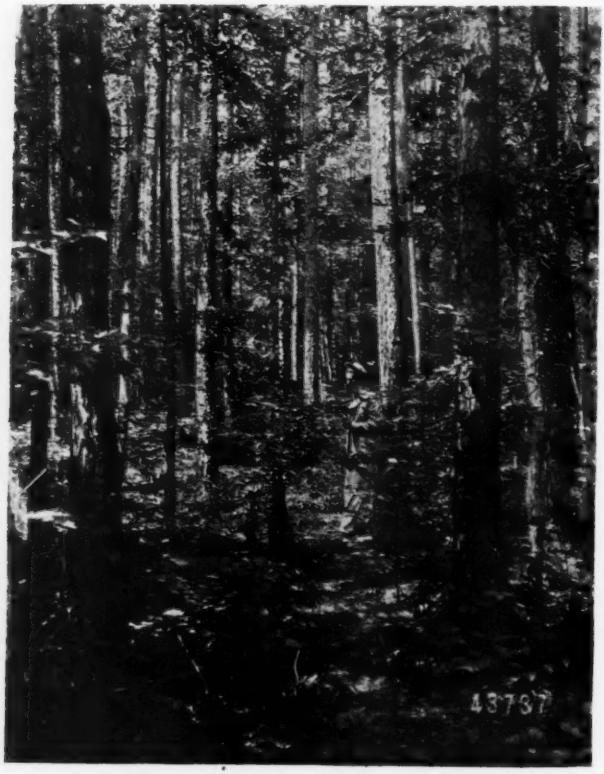
THE STATE'S RESOURCES.

The forest products of the State are worth about $5,000,000 annually, and rank next to the agricultural products. Nearly all of the original growth has

been cut and, under neglect and misuse, most of the cut-over lands are not yielding half a crop. When we consider that nearly half of the land area of the State is in woods or brush, this means an immense loss—a loss not only to the land owners, but also to the State through damage to the industries that depend directly or indirectly upon a cheap supply of wood.

The relation in area between the farm lands and the forest lands has become fairly stable; the stage in our economic development has therefore been reached when there is little excuse for neglecting to apply the principles of improved forest management to woodlands that will probably always be woodlands. They should be regarded as producing capital and, as such, should return a good rate of interest. The forest area of the State, estimated at 44 per cent of the total land area, should be sufficient, under proper management, to furnish all of the timber we need, except, perhaps, some of the woods that cannot be grown here. As it is we are importing every year immense quantities of lumber from other States.

The woodlands may be divided into two kinds; first, those that are too rocky, sterile or swampy for agriculture or anything else; and, second, those having good soils suitable for agriculture, a small portion of which, however, would be of greater value for wood lots than for cultivated fields.



Good pole stand of loblolly pine

Wood is indispensable and a farmer must have his woodlot, even if it takes valuable land; although wood is a crop that will yield good returns on very poor soil. The woodlands have been culled over so many times for their best timber that what remains is of inferior kinds and of poor quality. Such a system of selection must naturally lead to an improvement of the growing stock. Under correct forest management each successive cutting should afford the opportunity to rid the forest of the undesirable trees and to foster those selected for the succeeding crop.

Because of the varieties of conditions in soil, elevation and climate in different parts of the State, there is a corresponding variety of forest resources. Almost all of the woods native to the eastern United States can be found within the State. In the mountains we find the spruce, hemlock, white pine, birch and beech—all valuable constituents of the northern forests. There are also through the western and central portions of the State the valuable white oak, red oak, poplar, walnut, hickory, etc., which give the middle Atlantic States timber of the highest quality. On the Eastern Shore is to be found the loblolly pine and cypress—so valuable a constituent of the Southern forests. It would seem that all of the eastern portion of the United States has contributed of its best to give Maryland a rank unexcelled among the States in variety of species, particularly those of commercial value.

THE STATE'S NEEDS.

The forests of Maryland bear a close relation to the important industries of the State and have helped immensely in their development. The woodlands are constantly drawn upon to supply the lumber manufactured in the State which, according to the incomplete returns of the last census, had a value of $2,650,000, and gave employment to an average force of 1,964 men. In every community there is a demand for building material of various kinds which the local sawmill is called upon to supply. The material manufactured in this way is not generally included in the census returns, but amounts to a great deal.

In the western part of the State are coal mines of inestimable value. In the operation of these mines, large quantities of timber are required. The shortage in the supply must, of necessity, seriously handicap the development of the State's mineral resources. According to the last census, the value of the mineral product for the year 1902 was over $7,000,000 and gave employment to 6,826 men.

Maryland has always been noted for its tanneries. Since the operation of a tannery is dependent upon a cheap supply of bark of special kinds, the continuance of this industry is jeopardized with the exhaustion of the supply of hemlock and chestnut oak bark. In 1905 there were only six tanneries using 7,500 cords of bark, valued at $45,000, which represents a serious decline in this industry.

Another industry dependent upon wood is that of the pulp mills. No accurate statistics are available, but it is beyond question that this industry is a large user of wood and must be encouraged. We all know the importance of railroads in developing the State's resources, and yet railroads cannot be built without an abundance of timber for ties and bridge construction. In the same way the telephone and telegraph companies, which are so necessary to the business of the State and minister to the convenience of the public, depend upon the forests to the extent of hundreds of thousands of trees every year. Causes which operate to reduce our forest resources must, by the nature of the relation which the forest bears to these industries, hinder their development. The converse must also be true that anything which will increase the productiveness of our forests will materially aid these industries.

The woodland owner should recognize the forest as his capital, and the

increase as the interest yielded by the investment. If he takes more than a legitimate interest, or the natural growth, he is cutting into his capital. With our present knowledge of tree growth and the requirements of trees, it is possible to determine with ease, and a fair degree of accuracy, the rate of growth, and the best methods of treatment to secure the best results. Even if it were possible to put every acre of our woodlands under forest management at once, there would be a shortage of timber before the lands could recover from their present condition and produce another crop. This is overcome, in a measure, by the treatment of woods with certain preservatives, whereby those which have been regarded is inferior may take the place of very durable woods. In this manner is effected a great saving in our forest resources, which may long defer the timber famine predicted by many to be due in twenty years.

BRINGING FORESTRY TO THE ATTENTION OF THE PEOPLE.

However much we may see the need of introducing forestry, little can be accomplished until the land owners are convinced that it will pay. Nearly all of the woodlands are owned by farmers, and it is to them that we must appeal. Forestry is so new and little understood that progress will be slow. It is the purpose of the State to utilize all the available channels of information for reaching the owners of woodlands. The county newspapers and the public press generally are being used for the dissemination of information regarding forest resources and the work that the Board of Forestry is doing. Special articles on forestry subjects are being published in the county papers. An extended list of names of those who may be interested in forest improvement is being prepared; and as the publications of the Forester's office are issued they will be mailed to all on our mailing lists. The members of this society can do us a good service by sending in the names of those who own woodlands and might be interested.

As time and opportunity offer, the State Forester addresses Granges, Farmers' Clubs and Farmers' Institutes. These addresses are confined to practical forest problems, such as the farmer meets in his woodlot or timber tract.

Whenever practicable, visits are made to neighboring woodlots, and the principles of forest improvement are illustrated by object lessons. The law provides that the State Forester may co-operate with owners of woodlands and with those desiring to do forest planting by advising with them as to matters of forest improvement. The policy of the State is to offer freely the services of an expert in giving advice and making plans which the woodland owner is at perfect liberty to accept or decline. The offered help consists in making examination of the woodlands in company with the owner and in drawing up a plan that shall not only meet the owner's desire that the forest shall serve its proper purpose, but that shall, at the same time, provide for forest improvement. This plan is submitted for his consideration and guidance.

This work, it is believed, will be helpful not only to the individual farmer but to others, in that examples of conservative forest management distributed over the State will serve as object lessons in the meaning and results of practical forestry.

STATE RESERVES.

Another feature of the forest policy of the State, and one that is more fully under State control, is the creation and management of forest reserves. In every State where there are mountains there is urgent need of State or Federal Forest Reserves. There are several reasons for this. The forests on the mountains are of importance, apart from their timber production. They are located at the headwaters of important streams, and, as such, help to preserve an evenness of flow, not only preventing floods, but aiding in

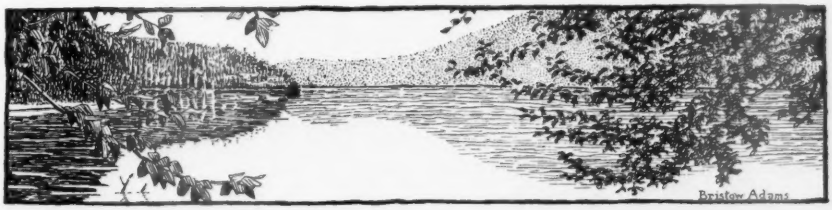
the development of water-power. In high altitudes, under a more rigorous climate and with sterile, rocky soil, timber growth is slow. After the original growth has been cut and fires have burnt up or severely damaged what is left, the owner does not see any profit in holding the land for a future crop which he may scarcely hope to garner in his lifetime. The land is unfit for agriculture, and hence, if he can sell at all, he will sell for a very low price. He may hold it for a few years, and then, discouraged, let it revert to the State or county for unpaid taxes. This creates a lot of waste land, that is not only unproductive to the owner but fails to perform its best use as a watershed cover.

Protecting mountain forests should serve several uses: 1. It will furnish a supply of timber; 2. it will protect the watersheds in which are the sources of important streams, thus regulating the stream flow in such a manner that destructive floods will be prevented and uniform flow, productive of water-power, will be insured throughout the year; 3. it will furnish a pleasure ground for the people, where natural beauty may be preserved and game may be protected. It is apparent that the individual cannot be depended upon to look after these interests, and it, therefore, devolves upon the State to control a large part of these mountain lands.

Already the State, through the gift of Mr. Robert Garrett, has about 3,500 acres in this region, and it is hoped that further acquisitions may be made. By putting the land under systematic forest management, it is hoped to furnish an example of what practical forestry can do in the mountains. If, as we believe, it can be shown that conservative forest management is practicable in the mountains, private capital will be encouraged to enter, and men seeking recreation and cheap land will find it desirable to acquire estates in the mountains, as has so largely been done in the Adirondack region of New York.

FOREST WARDEN SYSTEM.

The law provides for the appointment of Forest Wardens, whose special duty is the suppression of forest fires. Before we can put forestry in the mountains or anywhere else on a safe and sound basis, fire protection must be assured. It is a recognized duty of the State to provide fire protection for the forests exactly as a city provides fire protection for private property. It is one of the things for which we pay taxes. A Forest Warden system will be organized in all parts of the State when the danger of forest fires warrants such a course. Our laws are adequate for the protection of property. It remains for the individual citizen, by his loyalty and public spirit, to assist in its enforcement.



PROGRESS OF WOOD PRESERVATION IN 1906*

BY

CARL G. CRAWFORD

Forest Inspector, Forest Service

IN considering the question of the progress of wood preservation in 1906 we are confronted with the difficulty of separating that particular year from the ones immediately preceding it. In trying to draw a fast and somewhat arbitrary line between two periods of the same process of development, the edges necessarily merge and overlap to a considerable extent. However, by care in selecting the few features of prime importance which distinguish each period a division can perhaps be made with not too great a sacrifice of the details common to each.

In the question of the recent development of wood-preservation, however, we are unavoidably carried back to the beginning of the twentieth century. To the changes which were then inaugurated, or which were at that time first brought to the attention of the public, is due the marked development in wood-preservation which reached so gratifying a height in 1906.

Prior to the year 1901 about fifteen timber-treating plants were operated in the United States. Most of these were using methods which had been brought over from Europe several years ago. Even if American improvements had been made originally, all progress and development seemed comparatively at a standstill. The great bulk of the work was confined to a few classes of material, for which the practicability of artificial preservation had long been established, and little effort was made to better the treatment, or to extend the industry to new purposes. The operators were, to a large extent, working in ignorance of each other's methods, and there was little opportunity for discussion and mutual improvement; nor was there any concerted action for extending the activities of the industry. The public was largely ignorant of the processes in use, and even of the principle itself of artificial preservation. In certain quarters, moreover, there prevailed the mistaken idea that a more thorough public knowledge should be discouraged. Also, the complex chemical character of creosote and the difficulty of detecting adulterations induced fraudulent transactions, with the inevitable result of bringing public distrust upon the entire industry. Even the largest consumers of treated wood lacked a well-balanced knowledge of the particular advantages and limitations of each of the several methods of treatment. In certain cases too much was expected, hence dissatisfaction arose when the preservative protected the timber merely from decay and not from mechanical wear. In others they failed to avail themselves of the full advantages which the treatments offered. Thus, we read of the unwise use of soluble antiseptics in situations subjected to excessive moisture. For overcoming these unfavorable conditions and establishing, on a firm commercial basis, an industry which will continually increase in

*Read at annual meeting of Wood Preservers' Association, Memphis, Tenn., January 15, 1907.

importance and national benefit, much credit must be given to those far-sighted engineers and operators of wood-preserving plants, who, by their incessant efforts and the uniformly high character of their work, dispelled public ignorance and distrust, and opened up the way for the rapid advancement of the past few years.

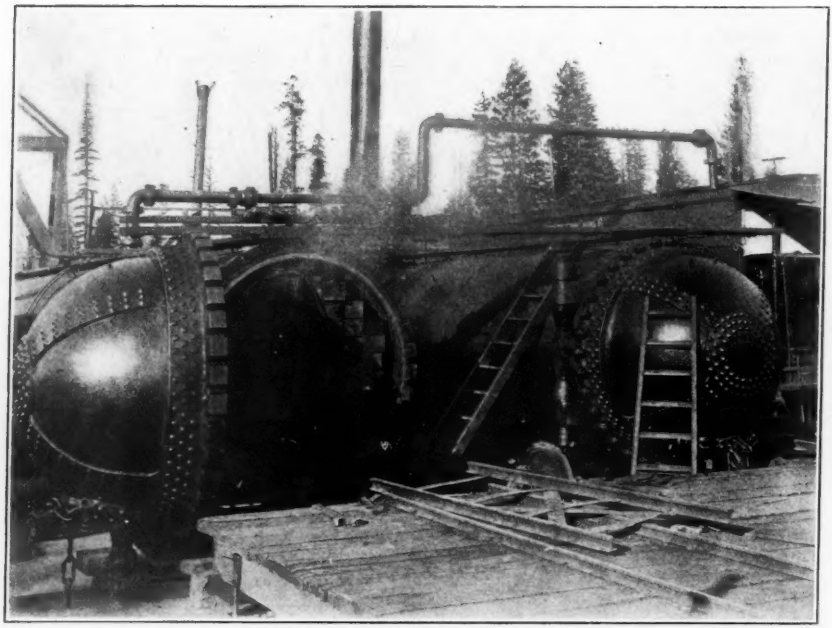
However, it is improbable that any personal efforts could have availed against the fierceness of competition which then prevailed among the large consumers of structural timber, compelling the sacrifice of future good to present necessity, had they not been assisted by two monumental changes in the economic conditions of the country. Of these, the one of greater importance has been the near approach of a serious shortage in the supply of structural timber. It is only a few years since the forest resources of the country were almost universally believed to be inexhaustible—that unlimited forests lay beyond the ones which were then being exploited, and that as railroads and sawmills penetrated deeper and deeper into the wilderness the supplies of timber would be augmented rather than diminished. Of the serious character of this mistake, and of the newly aroused and more truthful sentiment which is now making itself felt, it is unnecessary for me to speak. Consumers now realize that artificial preservation must be employed, first, because the renewal of certain species of wood is unusually expensive, and second, because such preservation works a material reduction in the amount of structural timber required.

Of almost equal importance has been the indefinite, but none the less radical change, which has taken place in the economic and industrial situation of the United States. The feeling of insecurity, of uncertainty of the developments of the future, which so strongly characterized the last decade of the nineteenth century has now given place to more normal conditions, and for almost the first time in the industrial history of the country capitalists feel at liberty to build upon future conditions and developments. This has, as a logical consequence, permitted the investment of large sums in preserving the timber used in extensive engineering enterprises. And the extent to which present dividends can safely be reduced in order to yield a greater return in the future can be proved with almost as great accuracy as any other detail of a large financial enterprise. It may even be said that these conditions are almost sure to be intensified, and that the coming years will prove that a prudent regard for the future supply of timber is even more imperative than it now appears to be.

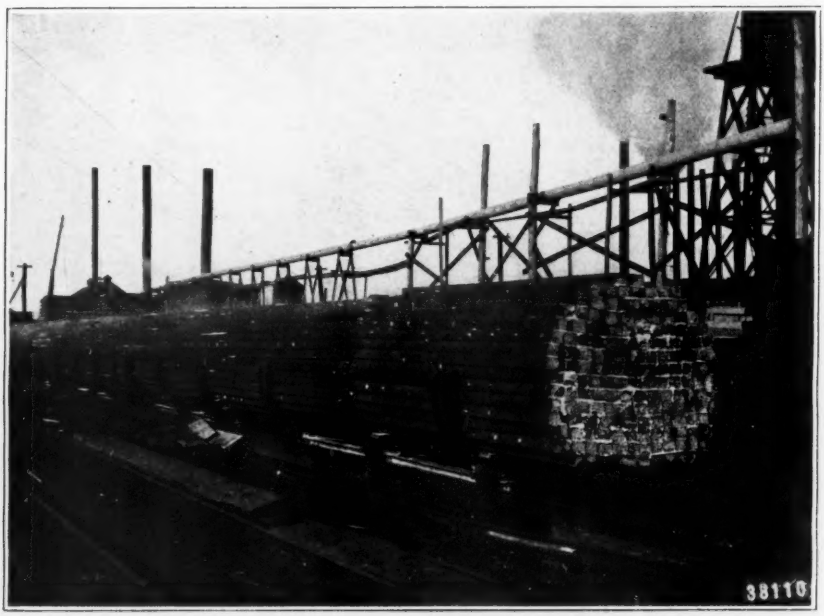
As a result of these two causes, together, of course, with others of minor importance, the last few years have witnessed a great activity in wood preservation throughout the entire country. This activity may be said to have manifested itself along the following lines:

First, the increase in the number and capacity of treating plants; second, the improvement in the existing methods, the introduction of new methods from abroad, and the development of methods peculiarly American and designed to meet American requirements; and third, the promoting of a more careful and detailed study of the technology of American woods, and an investigation of the constituents and properties of the preservatives in general use.

Of the first of these it is unnecessary for me to speak. In the thirty years preceding the twentieth century not more than fifteen plants had been erected. In the following six years this number was increased to nearly fifty, while in 1906 alone no less than five plants were erected. And you are all familiar with the increase in their capacities from one or



Treating Plant, showing charge of cross-ties in one cylinder



A load of treated cross-arms just drawn rrom the cylinder

two cylinders to the present equipment of five or six; in their lengths, from 100 to 160 and 180 feet; and in their diameters, from 6 to 9 and 9½ feet. I would call your attention especially to the second and third.

The ultimate aim of every method of wood preservation is, of course, to adapt the treatment to the species and the conditions in which the treated wood will be permanently placed; and by its success in fulfilling these two objects economically and efficiently the value of a process must be judged.

During the middle of the past century, when neither the industrial situation of America nor the probability of a future scarcity of structural timber could justify a similar movement in this country, economic conditions in Europe were such as to stimulate the development of the wood preserving industry. Hence, when the conditions in America became analogous to those in Germany, France, and England, it was natural that we should look to those countries for experience in our first efforts to effect a remedy. Thus, our first methods in America were wholly of foreign origin. Some of them had proved of decided value in the old countries, while others had scarcely passed the experimental stage before their importation. On being transplanted to American soil, and compelled to meet American conditions, some of these processes readily adapted themselves to their new environment, and may now be regarded as permanent and important factors in the future development of the industry.

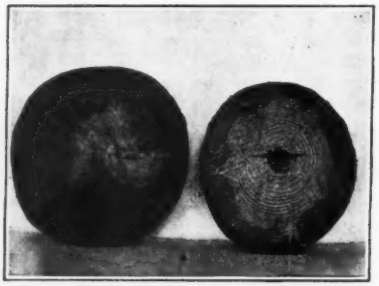
On the other hand, the explanation of the failure of other processes after introduction to this country must be attributed to one or both of two causes; either to some inherent and fatal defect in the methods themselves, which had remained unknown or had been hidden from their American exploiters, or to their inability to meet American conditions and competition. But the point I desire to emphasize is, that whether these foreign processes have failed or succeeded, their greatest value in this country has been due to the modifications and improvements which they have suggested, and in the interest which they have stimulated.

This study of the various processes in their modified forms has brought into prominence the true value of the essential features of each process; and it is therefore easier to determine where they should be applied and in what cases they may safely be omitted. This, together with our more intimate knowledge of American woods, has enabled us to simplify and cheapen many of the other processes when applied to certain species. Thus, while it is recognized that under certain conditions the application of pressure must play the most important part in the treatment of certain species, it has also been demonstrated that it may often be entirely omitted, and that greater emphasis should be placed upon the preparation of the wood before it is subjected to artificial preservation. The recognition of this fact a comparatively short time ago now promises to result in the development of a simpler and cheaper method than any in previous use.

During the past year the Forest Service conducted several series of experiments on what has now come to be known as the open-tank method. Timber in various forms was treated, as fence posts, telephone poles, cross-arms, mine props, railroad ties, and the like. While, as might naturally be expected, this method cannot be applied promiscuously to all species of American timber, it has, nevertheless, been studied with sufficient thoroughness to make clear that it is of permanent importance, and that its influence will greatly increase as its applicability is extended to new species and to

new purposes. It also permits the benefits of preservative treatment to be extended to industries where some method of wood preservation is desired, but for which the more elaborate processes are too expensive.

However, its value to the industry as a whole does not stop here; but the study which has been devoted to it has also thrown a new light upon other points. When the method was first introduced, the penetration was supposed to be due largely to the evaporation of the moisture in the wood, with a consequent creation of a vacuum. Hence, it was supposed



Seasoned two months — Absolutely green

Sections from the centers of ten-foot logs of Southern Pine, showing the penetration of creosote in seasoned and green timber, subjected to the same treatment for the same length of time.

that green timber could be treated better than seasoned. Our experiments, however, have shown that successful penetration is not due so much to the expulsion of the water as to the expansion and escape of the air in the structure of the wood. These experiments have also furnished additional evidence of the poor qualities of wood as a conductor of heat, and therefore of the difficulty of obtaining temperatures in the interior of large timbers sufficiently high to volatilize the moisture in the wood cells. It is less difficult, however, to expel the air, and so to enlarge the openings in the cell walls with heat as to increase the ease of circulation between the different cells.

A study of the preparatory processes commonly used in the artificial seasoning of timber for preservation has also thrown new light upon the real value of steaming and vacuum. The superiority of air-seasoning over any mechanical process or device has been clearly shown. But at the same time it is recognized that timbers which are of dense structure, or which do not receive a uniform penetration should be subjected to some artificial preparatory process. The complaints which have hitherto been made have been occasioned by the abuse of such processes, rather than by the processes themselves; and our increased knowledge has permitted us to employ them without injuring the timber. We now know that the real value of steaming timber lies in its ability to warm the wood rather than in its seasoning effect or in its decomposing and dissolving the organic materials in the cell walls and cavities. We also know that the long steaming is often unnecessary and even injurious, and, by increasing the cost of preservative treatment and detracting from the structural strength of the material, a serious detriment to the extension of wood preservation. For many species, also, more exact information has been obtained as to the amount of moisture in the green state, how much must be seasoned out before treatment, and the forms of piling and the length of time necessary to bring this about.

A result of far-reaching importance has been the comparatively recent effort to adapt the form of treatment to the technological structure of the material. If the statement had been made several years ago that not only the preservative but the treating plant itself must be adapted to the peculiar structure characteristics of the timber with

which it was expected to deal, the speaker would have been considered an impractical theorist. But so great has been the extension of our knowledge within the past few years that now the character of the timber is fully considered before deciding upon the process of treatment or erecting the plant.

It is also gratifying to note that the choice of the preservative is now receiving the attention it deserves; for in deciding whether to employ an oil or a salt there are certain considerations, the neglect of any one of which may lead to the failure of the entire process. The necessity of adapting the treatment to the climatic conditions to which the material will be exposed, as well as for the purposes for which it is used, is now generally understood. Of more recent date has been the recognition of the fact that salts can profitably be used when the density of the timbers renders the penetration of creosote extremely difficult; and that the preparatory processes should be adapted to each method of treatment. Some consolation can be found in the fact that dense timbers, if difficult to penetrate, are also slow to lose the preservative after treatment. Thus, some species retain the antiseptic salts much better than others; and this variability is often seen in individual timbers of the same species. This partly explains the remarkable durability of certain ties over others of the same species, and under similar conditions. It is also of direct value in deciding whether or not some chemical device should be employed to prevent leaching. I refer particularly to the use of such devices as glue and tannin in the Wellhouse process in preference to the simple Burnettizing. While the former has unquestionably been found of value in the treatment with zinc chlorid of loblolly pine and other porous timbers in which the leaching is very rapid on exposure to the air and soil, the wisdom of its application to the denser species is open to serious doubt.

This matter of the leaching of the preservative after treatment has done more than anything else to discourage the use of antiseptic salts; and the tendency to confine the treatment to insoluble oils is making itself felt to-day. But in the great advance in wood preservation which has been made, and which will be made in the future, at least for some time to come, salts must play an important part. As our knowledge becomes more generally diffused, the soluble salts will find their true place in the industry and maintain it by their own worth. For, just as study has revealed new uses for creosote, similar results will follow the attention which the salts are now securing. The probability of this result is increased when we consider the abundance of the available supply, its comparatively low cost, its ease and safety of storage, and the cheapness of its transportation. For oil shipped from the nearest source of a large supply to Rocky Mountain points the freight charges are as high as 12 cents per gallon, thus rendering almost prohibitive any attempt at timber preservation unless some cheaper and lighter material can be secured. But until the production of creosote is increased all specifications and all other efforts to advance the industry must prove of no avail, for at the present time it is often necessary to accept what is available rather than what is most desirable.

But these are really minor difficulties, and undoubtedly will be overcome by the same intelligence and energy which has advanced the industry of wood preservation in the United States so rapidly in the past few years. On the whole, it may be said that at no time have we had greater cause to look back upon the past with satisfaction and upon the future with expectancy.

Theory unsupported by experience

is no longer tempting us from the paths of steady progress, and at the same time even the most experienced operators are glad to acknowledge their indebtedness to pure theory. We are thus on a firm working basis; we are in a position to appraise new methods at their actual value for conditions in the country, and we can modify or adapt them without disturbing our own equilibrium. And what is most important of all, we are working together as one body for the advancement of our common cause. The existence itself of such an association, led by such leaders and enthusiastically supported by the presence of representatives from all parts of the country, presents the strongest evidence of the success to be achieved in the future that lies before us.

THE PROGRESS OF FORESTRY IN THE UNITED STATES

An address by Alfred Gaskill at the Inauguration of the Department of Forestry in the University of Georgia, at Athens, Ga., November 27, 1906

Chancellor Barrow, Ladies and Gentlemen:

I should like to satisfy you, at the outset, of my deep interest in the purpose of this meeting, and that it is a great pleasure as well as an honor to have a share in it. I am glad to be the bearer of the greetings and good wishes of the Forest Service, and to assure you of its sincere hope that the school of forestry here established may be a complete success. The evidence that forestry has made substantial progress in the United States is found here and now. This school marks a long advance step, and, if we except the private school at Biltmore, N. C., which I had the good fortune to attend, and to which I am much attached, will rank as the first regularly established school of forestry in the South.

If we consider the beginnings of forestry in this country we shall find that it had its origin in a protest, made on the one hand by people who foresaw the exhaustion of our timber supplies, and on the other hand by people who loved the trees and forests for their own sake. The former were fearful that the country would suffer a wood famine, the latter were more insistent, and succeeded in raising an antagonism against those who were actually engaged in using the forest. As a result we soon had a group determined to save all the trees, and opposed to them a group determined to cut most of the trees. This was unfortunate, because it indicated lack of a true understanding of the situation. The interests of both parties are, in fact, identical. The forests of this country have been the greatest source of our national wealth, and however much we may love them, no one has a right to demand that the owner of a forest shall maintain it for another's benefit. That is the long and short of the situation. The forests of this country are still for use as they always have been, and the proper attitude to take toward the lumberman is that of helpfulness; to point out how he can cut the trees and still save the forests. The principal tool of the forester is the ax. We cannot afford to ignore the esthetic side of this matter when the trees that adorn our yards and lawns are concerned; they should have all the care and thought that we give to our best friends. But when it is a question of the forest, something from which wealth is produced, it must be

looked at from an altogether different standpoint. We must bear in mind that if the great pine forests of the Lake States had not yielded timber at the time and in the way they did, it would have been impossible to develop the great agricultural wealth of the Prairie States. These States, as you know, had no timber of their own; farms could not be established without buildings and fences; fortunately the necessary supply was near at hand. It is altogether probable that the city of Chicago gained its great prominence and importance because of the fact that, through it, the timber of the North was distributed to the farms of the middle West.

In considering the importance and possibilities of forestry in the United States, our attention is directed to what European countries have done. As a matter of fact, all European countries have done practically the same as ourselves; the only difference is that they started early. What I mean is that in many cases their forests were exhausted, as ours have been, before the people saw the need of caring for and developing them. We must not forget that in many ways Europe is at least 300 years ahead of us. In this question of forest protection, it may have been that far ahead 20 years ago; it is certainly less than 100 years ahead now. You will find many of the States in Germany, and even some of their cities, provided with forest property from which a considerable part of the communal income is derived. The city of Nuremberg has owned and maintained its own forest for a thousand years. The city of Zurich, in Switzerland, has likewise worked a forest in the mountains near-by for upwards of 400 years. These are exceptions, however. One may find on that side of the water examples of bad forestry as well as of good. Our task is to profit by what European countries are now doing, and to acknowledge our thankfulness for what they teach. In considering the subject of forestry from this standpoint, I hope to make it clear to you that forestry is not an idea, but a principle evolved from national necessities. We started in this country with altogether too much forest, it was necessary to remove a large part of it in order that men might live. Now we have gone too far, and are in danger of denuding the land entirely, and exposing ourselves to all the ills that follow.

Let us turn now to a consideration of what the forest movement actually has been in this country. We shall find that it is largely connected with the activities of the National Government, because for one reason or another the people have looked to Washington for guidance in this matter. The Forest Service makes no claim to sole authority on this subject. It willingly stands aside where other organizations are doing the work. The beginning of the movement may be traced to the early seventies, when the need for greater care in the utilization of our forest wealth began to be talked about. In 1873, the American Association for the Advancement of Science appointed a committee to memorialize Congress and the State Legislatures, asking for an investigation of the conditions. In 1876, Congress ordered an inquiry of this kind to be conducted under the direction of the Commissioner of Agriculture, and appropriated $2,000 for the purpose. The results of this investigation were published in a report giving considerable valuable information concerning the forest conditions of the country. This was followed by a number of other reports prepared and published under the authority of the Commissioner of Agriculture. In 1886, a division of forestry was created in the Department of Agriculture, and Mr. Fernow, the first professional forester in the United States, was made chief. He conducted the office for 12 years; directed many important investigations, and kept the subject constantly before the people. In 1898, Dr. Fernow was called to organize the School of Forestry in Cornell University, and Mr. Pinchot suc-

ceeded him at Washington. In 1901, the activities of the office had so increased and broadened that the division was raised to a bureau, which means that its responsibilities and opportunities were greatly extended. In 1905, the present title of Forest Service was given at the time the care of the national reserves was transferred from the Interior Department to the Department of Agriculture. These reserves, as some of you may know, have been created from the national domain by Presidential proclamation under the law of 1891, or by act of Congress. Not all of them are actually forest land, for in some cases it was thought wise to create a reserve where forest was merely a possibility, not an actuality. At the present time the total area of the reserves is upwards of 110 million acres, equivalent to about three times the area of the State of Georgia. The proper administration of these reserves is an obligation which the Forest Service must worthily discharge.

As I said a moment ago, the history of forestry in the United States has been very largely that of the activities of the United States Department of Agriculture, but it is not wholly so. Under our system of government, purely State affairs lie entirely within the State's control. This necessarily throws the care of private forests and the protection of forest interests into the hands of the State authorities. In general, it must be said that this obligation has been neglected. Most of the States have not done what was possible for the good of the forests and the people directly or indirectly dependent upon them. Of late, however, there has been a distinct advance in the other direction. In perhaps a dozen States there are officers charged with the care of forests, and others are rapidly falling into line. As a rule, the interest is most active where most has been lost. I mean by that that where a State has derived great wealth from its forests, most of which have now disappeared, there is a desire to do something to bring back their former possessions. Pennsylvania and New York probably lead in their care for the forests. Both once had great wealth in forests. Each now possesses a large State reserve, and each is gradually giving more money and more thought to the care of its woodlands, both private and public. Michigan, as you know, was the pine State; it is trying to recover something of what it has lost. How much is gone can be judged from the fact that the State has upwards of six million acres of barren, worthless land that once held valuable forests, but which now has so little value that the former owners have thrown it back on the State rather than pay the taxes.

This brings me to the point that I want to enforce here. Georgia has not yet lost all her forest wealth. There is time to profit by the example of your neighbors, by creating a policy which shall look to the proper use of the forests of the State. On every hand one finds evidence of the industrial awakening in the South. Not a small part of this is based upon the value of your woodlands. Lumber in large quantities is being manufactured and sent to other parts of the country. Better than that, manufactories requiring wood in various forms are being established among you. Wagon factories, barrel factories, and furniture factories are moving from the North to the South to take advantage of the nearness of the timber supply. They have moved from the North because the material that they require is all gone. Where they will move when the supply in the South is likewise all gone, no one knows. It is, however, entirely possible for the South to keep every one of these industries here by adopting and enforcing a policy which shall maintain the forests upon which they depend. Chancellor Barrow has referred to the fact that the forests of

Georgia are practically gone, or are rapidly vanishing. I am glad to be able to disagree with him. There is no doubt that a large part of the forest has been cut, but much yet remains, and if you are disposed to take advantage of the present opportunity, you may easily keep these industries supplied with all the timber they need.

Now a word with reference to the school that you are establishing here. I am glad to learn from Professor Akerman that you are not going to attempt to make foresters right away. One of the difficulties that the Service has encountered is that too many men have gone into the work unprepared. The majority of those who graduate from forest schools necessarily enter the Government service. That service requires men capable and trained in many ways; therefore, it is necessary that those who go out from any institution shall be fully qualified. I shall not speak now of what those qualifications are; Professor Akerman is entirely capable of taking care of that part of it. This much, however, I want to say: that, in my opinion, there is no profession upon which a young man can enter that is broader or more broadening than forestry. He must know much of many sciences, of business as well; he will be brought into contact with the world and with men as well as with the knowledge that is found in books. There is also much pleasure in the practise of the profession. I know of nothing that is better than working in the woods. One gets inspiration and strength from association with the trees. That is part of our compensation, but we must not lose sight of those things upon which the success of our work is based—that is, practical results.

One word more: You lack here in the South organizations for the furtherance of this forest idea. I sincerely hope that the establishment of a school of forestry in Georgia means more than an opportunity for your young men to become professional foresters. There should flow from this institution an influence for the proper understanding of the objects of forestry that shall be felt all over the State. You will want, you want now, legislation; first, for the support of this school; next, for the general objects which this school represents. Do not expect the National Government to do all in this matter; much must be done at home, and in every locality there is work to do. You should organize right now a State association to take the lead in the work. Other States have shown that this is the most effective way of accomplishing what they desire. Mr. Akerman will tell you how potent has been the Massachusetts Forestry Association, and how, without its aid, it would have been impossible to accomplish many things that were most important. I thus see a great opportunity in the establishment of the Peabody School of Forestry, and once again I bid you Godspeed in the work. Much has been done, and much remains to do.

UNCLE SAM AS CEMENT MANUFACTURER

NO single feature of the national work of reclaiming the desert has attracted more general public interest than the Government's experiment in Arizona in manufacturing cement for the big Roosevelt dam.

Such a broad departure from what has long been held as properly the function and duty of the Government of the United States very naturally excited comment, particularly on the part of the manufacturers, who contended that it was not the province of the Government to engage in business in competition with private and corporate enterprise. Many of the friends of the Reclamation Service were dubious as to the wisdom of this step, and advised strongly against it. The circumstances, however, were such that the Government was forced into the position of cement maker, as otherwise a great irrigation project upon which the future of a rich and fertile valley depended would have to be abandoned.

The Salt River project is destined to furnish a permanent and adequate water supply for about 160,000 acres of land in the vicinity of Phœnix.

The town of Roosevelt, which will be submerged 220 feet when the Roosevelt dam is completed. Cement Mill and Government Camp.

WORLD'S HIGHEST DAM AND LARGEST ARTIFICIAL LAKE.

The works involve the construction of the Roosevelt dam, a ponderous structure of masonry and concrete 294 feet high, and 800 feet long on top,

Cement Lined Canal, Nevada Government Irrigation Works

locking a narrow gorge in Salt River and creating the largest artificial lake in the world. This massive masonry arch will require 240,000 barrels of cement. It is located 62 miles from a railroad and is reached only by wagon road, 40 miles of which are through rough, mountain country. Informal bids were solicited from several cement manufacturers, and the lowest was $9 per barrel delivered at the dam site, or a total of $2,160,000.

Just about this time the geological sharp in the Reclamation Service discovered an excellent ledge of limestone, which outcropped just above the dam site, and further investigation revealed excellent clay within easy distance. When these facts became known and it seemed probable that Uncle Sam would decide to make his own cement, the manufacturers, after vigorously protesting against the entrance of the Government into the field, demanded an opportunity to present formal bids. This was granted because, as a matter of fact, the Reclamation Service was not at all anxious to assume the responsibility of erecting and operating a cement plant. It had plenty of other work to do in that section without engaging in the manufacturing business.

The new bids were opened and the lowest was found to be $4.89 per barrel, a considerable reduction from former offers, but not sufficient to warrant acceptance. Figuring the lowest rates for rail and wagon haul, the price of cement at the mill under this bid could not have been more than 60 cents a barrel, which could not be regarded as exorbitant in view of the fact that Western mills are now getting nearly $2 per barrel from the Government for cement for other projects more advantageously located. It was evident, therefore, that the cement manufacturers were really desirous of meeting the situation fairly, and it was due solely to circumstances beyond their control that they did not secure the contract. Low as their bid was, it meant an outlay by the Government of $1,173,600 for cement alone, or more than $7 per acre for every acre

of land in the valley included in the project. A pretty heavy burden you will agree to put upon the farmers of Salt River Valley, who had mortgaged their lands to the Government as security for the repayment of the entire cost of the work, estimated at the enormous sum of $6,500,000.

As every dollar saved by the Government was a dollar saved to the farmers, the Secretary could hardly do otherwise than to proceed to manufacture cement when it was easily demonstrable that by so doing he could save half a million dollars. Finally, upon the advice of the engineers, the Secretary of the Interior authorized the purchase of a mill having a capacity of 350 barrels a day. The equipment was furnished by the Allis-Chalmers Company of Chicago, and was installed and put in operation as quickly as possible. From the day in which the first run was made to the present time there has been no reason to question the wisdom of the Secretary's decision. Notwithstanding the occurrence of frequent and unusual floods, which have retarded the work of the contractor who is building the dam, rendering it impossible for him to utilize the full capacity of the mill, the cost of manufacturing has seldom exceeded 50 per cent of the lowest price at which it could have been purchased.

Constant and careful tests of the product have proved the excellent quality of the cement, and the accurate cost-keeping methods employed show conclusively that Uncle Sam actually will save about half a million dollars on the cost of the project by reason of this experiment. The following table summarizes the cost of manufacture for the months of October and November, during which period the mill was working at only half capacity:

TONTO PORTLAND CEMENT MILL, UNIT COSTS.

Salaries and labor	$0.75	$0.70
Maintenance material	.14	.15
Quarry explosives	.015	.02
Clay digging	.03	.034
Clay hauling	.08	.074
Miscellaneous supplies	.05	.04
Miscellaneous labor and materials	.01	.016
Fuel wood	.01	.006
Fuel oil	.89	.89
Electric power	.15	.20
Total	$2.125	$2.13

The average cost of $2.13 per barrel is a trifle less than the Government is now paying for cement f. o. b. mills in several parts of the West. With the Government plant working full capacity it is estimated that the cost of manufacturing will not exceed $1.80 per barrel. Up to the present time, the mill has turned out 70,000 barrels of cement. Much of this has been utilized in canal lining, headworks, pressure pipes, aqueducts, and crossings. Now that the dam has been erected to river grade it is expected that the mill will be running at full capacity in the near future.

HOMES IN NEVADA

DO you want a home in the far West? Uncle Sam has 500 choice eighty-acre farms in western Nevada which he offers to industrious, practical farmers who are not afraid of work, and who know how.

These farms lie in Carson-Sink Valley, which was once the bed of an ancient lake, and are all watered from the great Truckee-Carson irrigation project, which was built and is being operated by the Government. It is a desert valley surrounded on the northeast and south by ranges of mountains, barren and treeless. On the west, 60 miles away, the snow-clad peaks of the Sierra Nevadas are plainly visible. The lands for the most part are level, with

View Showing a Stretch of Irrigable Lands that have been filed upon and homesteaded under the Main Truckee Canal, Nevada; Five Miles Southeast of Wadsworth, Nev.

occasional areas slightly rolling and hilly. The soils are composed of materials washed down from surrounding mountains, and are of great fertility. Fields which have been cultivated for forty years without fertilization show no diminution in crop yields. The friable character of the soils makes cultivation comparatively easy. The report of the Government expert briefly is as follows:

Climate, healthful, essentially an outdoor climate, mild in the extreme and especially favorable for persons with pulmonary troubles. Elevation, 4,500 feet. Soils of many varieties. Bench lands are sandy, well drained, and many sections are protected from frost and suited to the growing of finely flavored fruits of the hardy varieties. Bottom lands are heavier in texture and adapted to growing alfalfa, grains, vegetables, and the grazing of stock. Lands selected by the Government are comparatively free from alkali or other injurious minerals. A perfect drainage system has been provided by the Government, and each farm is well drained. Raw lands now covered with sage brush, rabbit brush, and greasewood. Clearing, leveling, and preparing for crops costs from $5 to $25 per acre.

The water supply is from Truckee and Carson rivers, is guaranteed by the United States Government, and is furnished through canals and ditches constructed by Government engineers. Each farm is connected by means of a lateral with the main canal system.

These farms can be secured by any citizen of the United States, who has not exhausted his homestead right, by making a filing before the land office at Carson City or the United States Commissioner at Fallon. Entrymen have six months from time of making filing to establish residence on the farm, after which they must live on the land and cultivate it for five years

before a patent is issued. The filing fee is about $8, payable when the entry is made. Settlers will be required to pay $26 an acre for the water right, payable in ten annual payments without interest, the first payment falling due on December 1st of the first year in which water is furnished during April, or earlier.

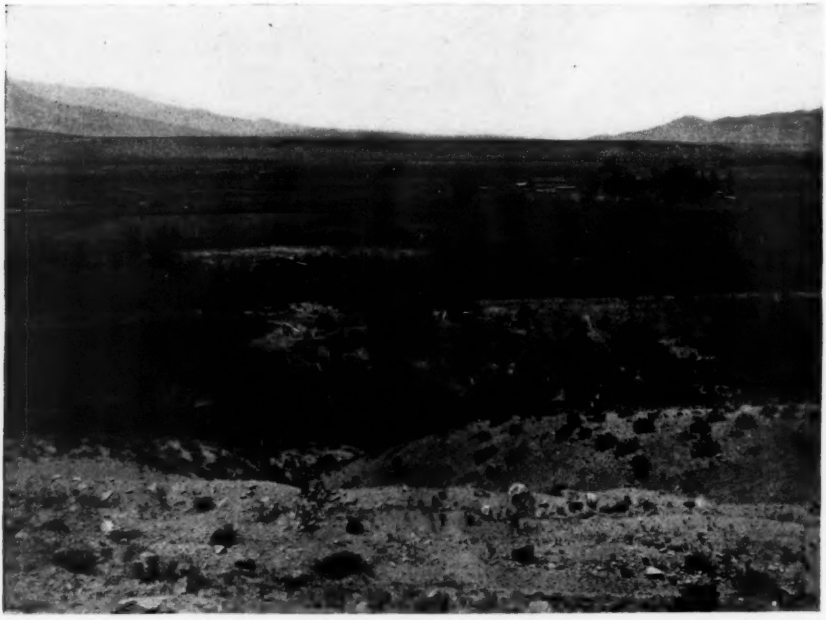
The Carson-Sink Valley will produce every variety of crop grown in the north temperate zone—three cuttings of alfalfa each year yielding five and seven tons per acre; wheat, 35 bushels; barley, 50 bushels; oats, 75 bushels. Corn has been but little grown, but recent experiments indicate that it will become a very profitable crop, yielding from 30 to 60 bushels.

The valley is destined to take high rank as a fruit growing section. Apples, pears, peaches, apricots, and cherries do well, and all fruit is finely flavored and sound. All common varieties of small fruit produce abundantly.

The home garden of a quarter acre will supply a family and furnish produce for sale. Potatoes yield from 300 to 400 bushels per acre, and the demand far exceeds the supply at present price of 2½ cents per pound.

There are splendid opportunities for stockmen in the valley to raise blooded cattle, sheep and hogs. Hog raising is destined to become a most important industry. At the present time the large packing house in the neighboring town of Reno is buying 800 head each month from Nebraska, as none can be had from Nevada.

All the products of the valley find a ready market at home, and in the mining camps in the nearby mountains, where farming is not possible. Any



View Showing Farm Lands Surrounding Wadsworth, Nevada, Embraced in the Truckee-Carson Project

surplus can be shipped to San Francisco, which is nearer to the valley by rail than Los Angeles.

Some capital is required, the amount, of course, depending upon the individual and the character of farming undertaken. At least $1,000 are necessary to erect a home, fences, shelter for stock, and to purchase farm machinery, tools, seed, provisions for family and feed for stock.

The United States Government, as evidence of its belief in the ultimate future of the Carson-Sink Valley, has already invested more than $3,000,000 in that section in an elaborate irrigation system of canals and ditches to cover 200,000 acres of land. Railroads now penetrate the heart of the valley, furnishing transportation for the products of the farms, and access to the great markets of the world. The population of the State has doubled within the last two years, owing to the discovery of rich mines in the mountains, and the home markets are demanding more farm products than the farmers of Nevada can ever supply.

If you are looking for a home for yourself or your boys don't go to the cold prairies of the far Northwest. Stay in the United States and go to Carson-Sink Valley, Nevada.

All the information you want concerning these farms, how to reach them, and anything else you care to know about the country will be cheerfully given if you write to the United States Reclamation Service, Fallon, Nev.

BY-LAWS OF THE AMERICAN FORESTRY ASSOCIATION

(Revised January 9, 1907)

ARTICLE I.

Name.

The name of this Association shall be "The American Forestry Association."

ARTICLE II.

Object.

The object of the Association is to promote the preservation by wise use, and the extension, of the forests of the United States; its means are agitation and education; it seeks to encourage the application of forestry by private owners to forest holdings large or small; and it favors, especially, the establishment and multiplication of National and State forests, to be administered in the highest interests of all.

ARTICLE III.

Members.

Section 1. Any person may become a member of this Association, as hereinafter provided.

Sec. 2. Members shall be divided into five classes: Patrons, Life Members, Sustaining Members, Annual Members, and Honorary Members.

Sec. 3. Any person contributing at one time the sum of one thousand dollars ($1,000) to the permanent fund of the Association shall be a Patron. Any person may become a Life Member by the payment of one hundred dollars ($100) at one time. Patrons and Life Members shall not be liable for annual dues. Sustaining Members shall be those who pay annual dues of twenty-five dollars ($25). Any forestry association or other organization approved by the Board of Directors may become a Sustaining Member. Annual Members are those who pay annual dues of two dollars ($2). Honorary Members shall be the officers of state, territorial, provincial, or other forestry associations, or the delegates from such associations, or the delegates of any government.

Sec. 4. Applications for membership shall be referred to and voted upon by the Board of Directors at any regular or called meeting therefor.

Sec. 5. All members except Honorary Members shall be members of this corporation and shall be entitled to vote and hold office in said corporation.

ARTICLE IV.

Officers.

Section 1. The officers of this Association shall be a Board of Directors, a President, five Vice-Presidents at large, a Vice-President from each affiliated organization, as hereinafter provided, a Treasurer, a Secretary, and an Assistant Secretary.

Sec. 2. The Board of Directors, President, Vice-Presidents at large, and Treasurer shall be elected by ballot at the annual meeting of this Association, and shall serve one year, or until their successors are elected. The Secretary and Assistant Secretary shall be elected by the Board of Directors at the first meeting following the annual meeting of the Association.

Sec. 3. Any forestry or other organization which may become a Sustaining Member shall be entitled to delegate as advisors of this Association three of its members, one of whom shall be elected by the Board of Directors a Vice-President of the Association. The advisors so elected from the various organizations shall constitute the Advisory Board of this Association.

ARTICLE V.

The Board of Directors.

The Board of Directors shall consist of fifteen (15) members, of whom eight (8) shall constitute a quorum. It shall elect its own Chairman and have the power to fill any vacancy occurring in its own membership or in the officers of its Association, the appointee to serve until the next annual meeting of the Association. The Board of Directors shall have the control and management of the affairs, funds, and property of the Association. It shall take, receive, hold, and convey such real and personal estate as may become the property of the Association for the purposes of the Association set forth in the certificate of incorporation and in Article II above. The Board shall meet at 4:00 P. M. on the day preceding that of the annual meeting of the Association, and at such other times as it may be called together by its Chairman. The Board of Directors shall designate five (5) of its members to act as an Executive Committee of the Association, to which Committee the Board shall, from time to time, entrust such duties as it may deem best in the interests of the Association.

ARTICLE VI.

The President.

The President shall preside at all meetings of the Association.

ARTICLE VII.

Vice-Presidents.

In the absence of the President, a Vice-President shall preside at the meetings of the Association; and in the absence of all of them, a President *pro tem.* shall be elected by the meeting.

ARTICLE VIII.

The Secretary.

The Secretary shall keep a record of the proceedings of the Association and of the Board of Directors, shall have the custody of the corporate seal of the Association and of all documents, books, and collections ordered to be preserved; shall conduct the correspondence of the Association, and keep a list of members with their addresses, notify members of the time and place of all meetings, and shall perform such other duties as may be assigned him by the Board of Directors.

ARTICLE IX.

The Treasurer.

The Treasurer shall have the custody of all moneys received. He shall deposit and invest the same in such manner and to such extent as the Board of Directors shall direct, and shall not expend any money except

under the direction or approval of the Board of Directors. The financial year of the Association shall close on December 31 of each year.

ARTICLE X.

Meetings.

Section 1. The annual meeting for the election of officers and the transaction of such business as requires to come before the entire Association shall be held on the second Wednesday in January, at such hour and place as the Board of Directors may determine, unless some other day in January be selected by the Board of Directors, in which case at least three weeks' notice must be given.

Sec. 2. A quorum shall consist of thirty (30) members of the Association (Patrons, Life Members, or Annual Members), as specified in Section 5 of Article III.

Sec. 3. Special meetings may be called by the Board of Directors. The Secretary shall give to all members at least seven days' notice of all meetings.

ARTICLE XI.

Dues.

The annual dues for Annual Members shall be two dollars ($2), payable in advance on the first day of January. The Board of Directors shall have the power to remit the annual dues of any member.

ARTICLE XII.

Amendments.

These By-laws may be amended by a three-fourths vote of the members present and entitled to vote at the annual meeting of the Association.

WITH MEMBERS AND CORRESPONDENTS

THE NATIONAL OFFICE feels strongly that the work of the Association should represent, not merely the few at Washington, but the many friends of forestry scattered throughout the length and breadth of our great Nation. To this end it invites correspondence regarding the forest situation and its needs the country over, and the efforts which are being made to meet these needs. The editor is but one; the members number thousands. Many of them have grown gray in the work; they are rich in experience and ripe in judgment. Their words of warning, counsel, encouragement and exhortation should be worth much to the movement. Let them be heard!

Others, again, actual or prospective members, desire information. The reply designed for one may be helpful to others.

Further, members of a great Association such as this, widely scattered, meeting rarely or never, should have some opportunity for becoming acquainted.

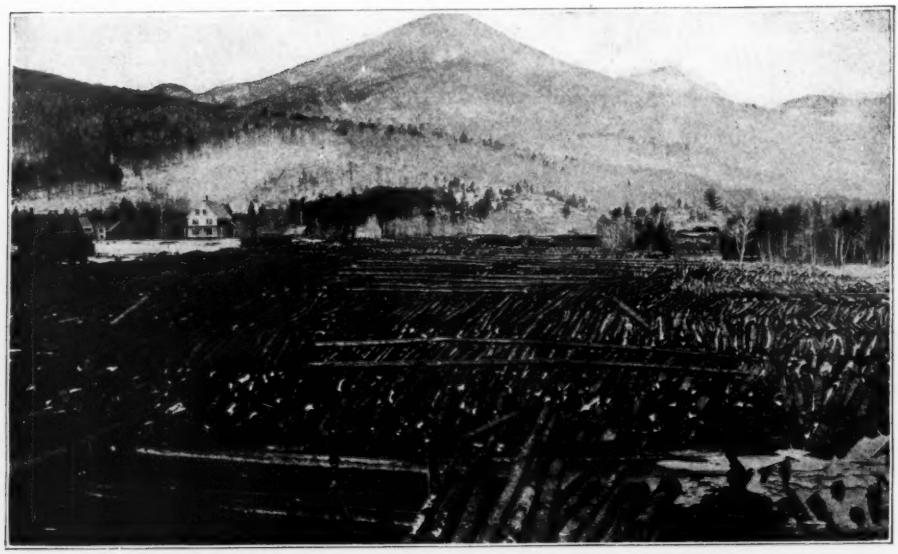
Beginning with this issue, space is to be devoted regularly to correspondence. Through this medium experience may speak, observations may be reflected, questions may be asked and answered, and members may, in a measure, come to know each other. On them must depend, chiefly, the success of such a department of the magazine. With their assistance it can be made one of the most interesting and valuable features of the publication.

Following are some extracts from correspondence of the American Forestry Association.

Eating the Cake

The General Manager of a large company writes:

"Enclosed please find check for $2.00, dues for the year 1907. I am thoroughly interested in the objects in which the Association is engaged, notwithstanding I am engaged in cutting



Logs and Lumbered Land, North Woodstock, New Hampshire

timber as well as mining. I realize that we cannot continue to cut timber without some provision for the future."

Such a proposition should appear axiomatic. If we continuously consume, and at an increasing ratio, without producing, how can we hope to escape the day of want and privation? Time was, it is true, when we talked of "our inexhaustible forests." But the ostrich-like optimism which once used such language has about disappeared. Air may be inexhaustible and, likewise, the waters of the ocean; but few other of the resources of mother earth are without practical limit. Soils, unrenewed, lose their productivity, and, long before the point of exhaustion is reached, the law of diminishing returns manifests itself. A generation ago William Stanley Jevons startled England with the warning that her coal supply could not permanently last; many Americans are coming slowly to realize that the same is true of their wood supply. The wise seek to forestall the day of want.

A Vermont correspondent says:

Indiscriminate Cutting

"The country all about the headwaters of our streams in south Vermont is being transformed by indiscriminate cutting of our forests. One gets a veritable heartache by the devastation."

As Dr. Hale says of the wreck of his New Hampshire pines, "It makes a man cry to see it."

From a Diplomat

Mr. John Barrett, of the Department of State, formerly U. S. Minister to Siam, the Argentine Republic, and Panama, and now to Colombia, in joining the American Forestry Association, says:

"I am very glad to know that the Forestry movement is to receive the greatly needed aid of such organization. This is a movement that has always appealed to me, and in the several different countries where I have served as United States Minister I have watched with interest and admiration the methods employed for the preservation, protection, and extension of forests. The work, moreover, of such

men as Mr. Gifford Pinchot is now recognized in all parts of the world—so much so that I have communicated with him to obtain books and data on forestry which I have distributed in the countries where I have been Minister."

Not every reformer is permitted to witness the general appreciation of his work.

against the day of adversity which must overtake us unless history capriciously determines to make an exception in our favor—and not repeat on this soil what has been the experience of all the older nations.

"I was reading last night J. J. Hill's excellent plea in this matter, in his address at the Minneapolis State Fair this year."

Excessive Erosion on nearly level land, Yazoo Uplands. Gullies with vertical walls eat into cultivated land with remarkable rapidity, and this may be prevented only by reforestation.

A Newspaper Man

Mr. Poultney Bigelow, the celebrated journalist, writes:

"No cause is more worthy than that of saving from destruction one of our grandest assets, our forest land.

"Prussia raised herself from slavery after the Napoleonic occupation largely by the thrifty administration of her forests, and it is not too late for us to do something towards providing ourselves with a *quasi*-national nest-egg

That a country can actually raise successive crops of wood for profit as an individual can raise successive crops of grain or vegetables for profit, is a new idea to many. The lesson of Prussia is one which America cannot learn too soon.

As for Mr. Hill, his declaration to the American Forest Congress should not be forgotten: "Irrigation and forestry are the two subjects which are to have a greater effect on the future

prosperity of the United States than any other public questions either within or without Congress."

The "Vandals"

A Los Angeles correspondent, Mr. David W. Cunningham, applying for membership, says:

"Am glad to help a little; it is quite late to begin, as the vandals here stripped nearly all the original thirteen States of pine lumber; have cleaned out Michigan, Minnesota, Wisconsin, and are now at it in the Gulf States, Mississippi Valley, California, Oregon, Washington and Alaska. I hope we may save something.

"Wish they could save some of the noble sugar pines—8 and 10 feet in diameter, and 200 feet tall. They are now cutting some in Mariposa and Merced counties, Cal."

An example of wasteful and destructive lumbering in the Sierra Nevada

We call them "vandals," and their activities to-day are, in many cases, as destructive of objects of utility as the operations of the followers of Gaiseric in the fifth century were destructive of objects of beauty.

Yet we should not be too hard on the lumberman. They are not "sinners above all other Galileans." They are simply doing what most other people are doing—following the line of least resistance on the road to a living or, mayhap, to a fortune. Most of us, similarly placed, would do just what the lumbermen are doing. Saving our national resources, such, *e. g.*, as minerals and forests, is not a task in which individuals, working on their own responsibility, can accomplish much. Here and there, one will conform his conduct to the requirements of the general welfare; but most will chase the Almighty Dollar regardless of the effects on the public.

As a people, we have a great lesson to learn: If we would have public interests cared for we must not leave them to private individuals. Most individuals have all they can do to care for their private interests. Public interests must be cared for by the public or, as a rule, they will not be cared for at all. And that is why the National forest reserve rests on a principle of adamantine rock. It represents the public ownership and administration of a public necessity. If National resources cannot be conserved in this way, they cannot be conserved at all.

If the sugar pines mentioned are of interest, not simply to the lumbermen, but to the State or Nation, then State or Nation, as the case may be, must interpose its arm in their behalf, or, all too soon, the mischief will have been wrought and the day of salvation passed.

Seeing Plus Doing

Mr. C. J. Orick, of Cumberland, Md., sends the following:

"Having travelled along both the

eastern and western slopes of the Appalachians from the line of the Pennsylvania Railroad in Pennsylvania southward to the end, I am somewhat conversant with the condition of things in that region, and can, therefore, appreciate the importance, yes, the absolute necessity, for the work which the American Forestry Association has undertaken. I have, in many instances, been a witness to the horrible waste of our forest resources in the territory indicated. I have seen vast acreages absolutely denuded and devastated, through wanton waste and inexcusable carelessness. I have seen lumbermen cut over an entire territory, covering hundreds of acres, felling everything that grew on that surface (instead of confining their cuttings to merchantable timber); then, after such a wholesale slaughter of growing timber was completed, the tops and the branches and underbrush were left on the ground to dry and furnish an abundant supply of fuel for the forest fires, which inevitably follow such a method of lumbering. The forest fires following have (in many cases, perhaps most) burned out all the humus in the soil, the result of centuries of forest decay, thus leaving, what should have been a fertile tract, a burned-out and barren waste. Though the wanton waste of our timber resources is bad enough, and the evil results which must follow are becoming better understood, yet the effect of a series of forest fires upon the soil of the forest section does not seem to have been recognized to any great extent (as an illustration, the Saginaw Bay timber section). Our reckless treatment of great forest resources in many instances not only wastes the wealth of timber but is destroying the fertility of the soil on which those forests grew.

"I enjoy a rather extensive acquaintance among the lumbermen, and the owners of the timber lands in that territory extending from the line of the Pennsylvania Railroad southward to the line of the Chesapeake and Ohio Railroad and east and west through the Appalachian chain and its foothills on either sides, and will be only too glad to interest myself in disseminating literature and securing memberships among the lumbermen and others naturally interested in the work. I will be glad to aid you in distributing literature and securing members in the territory named above."

Such a letter mingles the sweet with the bitter. Here is a man who sees the processes of destruction in progress all about him; but who, instead of contenting himself with uttering a Jeremiad on the degeneracy of the times, indicates his willingness to apply himself in a practical way to alleviate the situation. The American Forestry Association is eager to find people who will distribute forestry literature and push the membership of the Association. There are, in the possession of the National office, thousands of copies of FORESTRY AND IRRIGATION waiting to go on their mission of enlightenment, stimulus and healing. Are there not 500 more who will say with Mr. Orick, "I will be glad to aid you in distributing literature and securing members?"

NEWS AND NOTES (Continued)

Forest Fire Apprehended

Col. Frank J. Parker, a well known pioneer journalist of Oregon, predicts that a great forest fire will sweep through Oregon next summer. He bases his forecast upon the calamity which, according to tradition, befell the State some seventy years ago. He says:

"The Indians and pioneers who told me of the severe winter of about 70 years ago declared that the ice was so thick on the trees that all the big branches were pulled off and the trunks were left bare. When summer came, these fallen limbs became as dry as tinder. In some manner, fire got started in this underbrush and raced down the coast like a hurricane.

"For miles it swept everything in its path, leaving the once beautiful forests, that had been growing for centuries, simply a vast wilderness of seared and blackened stumps. * * * The fire also killed nearly all of the wild animals in its track, thousands of bears, wolves, cougars and wildcats having been roasted alive."

Referring to the terrible storm recently experienced by Oregon, he adds:

"Now I fear that this storm will cause the limbs on the forest trees to fall as they did years ago, and when summer comes, dry out. Then another fire may race through the timber, bringing ruin and death to many."

Governor Pardee's Address

In an address before the Citrus Institute at Riverside the last week in January, ex-Governor George C. Pardee summed up the problem of reforestation in southern California. He said in part:

"To render habitable and profitable, as parts of it have already been rendered habitable and profitable, all the lands lying beneath the bare, denuded mountains south of the Tehachapi, is the problem we are now facing. In all human probability, there fall sufficient snow and rain upon those southern mountains to render fertile and productive every cultivable acre lying at their feet. The trouble is that too much of it, a constantly increasing percentage, goes tumbling to the sea. Too small a part of it is made to render service to the farm and orchard. How shall it be harnessed and made to do its duty to those who would use it if they could?"

Calling attention to the ineffectiveness of schemes for saving waters by means of impounding reservoirs, he pointed out the superiority for this purpose of forests on the slopes, and said:

"The natural storage reservoirs, from which the now arid country once received its moisture, lay beneath the forests that once covered the now naked mountains. These forests should be restored. Or if that cannot be done, some other covering must be placed where it should be."

He added:

"Thanks to President Roosevelt and Gifford Pinchot, the head of the United States Forest Service, both of whom are true and loyal friends to California, the Government of the United States is doing much to solve these problems that confront us. These mountains of yours must and shall be re-covered with a vegetable filter. It must be done because upon it depends your future. Let the good work go on."

Washington

The *Spokane* (Wash.) *Spokesman-Review* of January 29 said:

"Work has been suspended on the Government's Okanogan irrigation system on Pogue flat along the Okanogan river, for several weeks on account of the severe weather. Several contractors contemplate starting operations at once. The suspension of the work rendered a large number of men idle, and all are anxious to go to work. No suffering has resulted in any of the camps, although the men have been chafing for a number of days over their enforced idleness."

The *Tacoma* (Wash.) *Ledger* of January 27 contained the following:

"Senator Ankeny has taken up with the Director of Geological Survey the

question of the feasibility of irrigating the 40,000-acre tract of land lying along Tucanon river in Garfield and Columbia counties. During the flood season it is estimated the river carries off twice the volume of water it does during the dry season. It is thought that by the construction of a large reservoir near the headwaters enough water can be stored to irrigate during the summer."

The *Seattle Post-Intelligencer* of February 2 reported a mass-meeting of Winthrop citizens held on that day, which protested vigorously against the action of the Forest Service in converting a large part of the valley into a forest reserve, and ended with the statement:

"An organization that will fight the order to the end was effected and every means at its command will be used to show the forestry department wherein it has erred."

An article, soon to appear in FORESTRY AND IRRIGATION, from the pen of Forest Supervisor Breen, points out how such demonstrations as this, once common, have, with practical experience of the beneficent effects of the National forest policy, given place to enthusiastic support.

Forestry Convention at Fredericton

The *Montreal* (Canada) *Star* of February 5 made the following announcement:

"Arrangements have been made for the holding of a provincial forestry convention at Fredericton on the same day, at which several prominent officials of Federal and State forestry departments in the United States will be present. An effort will be made to properly carry out in New Brunswick the new regulations for the protection and culture of the standing timber."

Enos A. Mills

The *Chicago Inter-Ocean* of Sunday, February 3, gave an extended illustrated write-up of the lectures by Mr. Enos A. Mills on the White Mountain-Appalachian question. Editorially, on February 6, it again referred to his work, and said:

"One of the noteworthy signs of the times is that the American people are at last becoming awake to the importance of forest preservation, reforestation, and the work of the Government Forest Service."

Forest Taxation

The Philadelphia *North American* of February 8 says:

"Surely it is time for the American people, and particularly for the people of Pennsylvania, to consider the necessity for preparation for the lumber-famine that is plainly within view. Unless active measures shall be adopted for the reproduction of woodland, children now living will find the country absolutely stripped of merchantable timber. * * *

"The first necessary step is to adjust the taxation of woodland in such a manner as to encourage, rather than to discourage, the tree planter. * * * We may fearlessly insist that the owner of unfertile land who plants trees in large numbers should not at once be punished by having his taxes increased.

"As things are, such a man is at the mercy of an assessor who is likely to be wanting in the highest kind of enlightenment, and every third year, if the trees are growing finely, the assessment will probably be advanced.

"That this kind of proceeding actually does deter owners of fit land from planting on a considerable scale is certain."

Mr. Sterling's New Field

Mr. E. A. Sterling, who has been in charge of the work in forest extension for the Forest Service, has resigned, to become forester of the Pennsylvania Railroad System. This is the first appointment of a technically trained forester by an American railroad, and shows recognition of the necessity for practical forestry. The adoption of forestry by commercial organizations has been prophesied for several years, and is fast becoming a necessity. In France the owners of woodlands are required by law to see that the tree growth is kept up, failing which the Government takes the land and promotes the work of reforestation.

Under the supervision of the Forest Service the Pennsylvania Railroad has already planted a million and a half of trees. Tree planting on waste lands will be continued, and it is likely that additional land will be purchased, particularly second growth loblolly pine lands in Maryland and Virginia. It will require 170,000 acres to supply the ties needed on the lines east of Pittsburg. Six hundred acres in Pennsylvania will be planted this spring and next with chestnut and red oak seedlings. The Pennsylvania Railroad uses 5½ million ties a year, and feels the pressure of necessity to provide for a supply of them.

The selection of Mr. Sterling for railroad forester is a good one. He has had charge of the extensive work done by the Forest Service in growing seedlings and planting them, both on areas that have been denuded and on those that have never borne trees. He has also supervised the co-operation with private owners of woodlands in maintaining the same and planting new woods.

E. A. Sterling was born June 27, 1878, at Brooklyn, Pa. He attended Keystone Academy, Bucknell College, and Cornell University, graduating from Cornell in 1902, with the degree of Forest Engineer. This was followed by one season in the German forests. Before coming to the United States Forest Service, he was a forester with the New York State Forest, Fish and Game Commission.

Fire in the Wichita Mountains

The *Wichita* (Kansas) *Eagle* for February 19 published the following dispatch from Oklahoma City:

"A special to the *Oklahoman* from Lawton says: 'A forest fire is raging in the 100,000 acre Government reserve, in the Wichita Mountains, ten miles southwest of here, and is threatening to devastate the entire tract. Despite efforts of the supervisor, his assistants and hundreds of citizens from nearby towns the damage already amounts to thousands of dollars to trees, grass and live stock. Forester Morrissey has appealed to the citizens for additional aid and the military authorities at Fort Sill are in readiness to send soldiers to assist in fighting the flames.

" 'A high wind which sent the flames eastward this morning is beginning to quiet down and if it does not come up again complete devastation may be forestalled.

" 'In the heart of the Wichita forest reserve is situated the National game preserve created last year by act of Congress for the propagation of buffalo. A fence costing $15,000 is now being constructed and the flames are near the tents and material.' "

Society of American Foresters

This society met on February 14 at the residence of Mr. Gifford Pinchot, 1615 Rhode Island avenue, and received valentines in the shape of valuable papers from Mr. E. A. Sterling and Mr. W. D. Sterrett, both of which were followed by discussion.

Mr. Sterling spoke on "The need of scientific investigations on the forest reserves." He pointed out that while the work of the Forest Service was originally almost wholly scientific in its nature, the care of the reserves had forced upon it so much administrative work that this was overshadowing the scientific side. He deprecated any necessity for neglecting scientific investigation, which must be the basis of administrative effort. He asserted that the personnel and commission of the Service were based on its character as a scientific bureau; and this character is further evidenced by its being a member of the International Association of Experiment Stations.

The trend of the discussion was that while the crush of administrative work prevents the doing of so much scientific research as would be done otherwise, yet our foresters being all of scientific training are qualified to seize whatever opportunities are allowed for scientific work, and take advantage of their direct contact with forest problems. The work they do carry on is such as would be appalling, by its mag-

nitude, to a European forester. Though necessarily crude, it is all to the good. Important scientific work is being done on the forest reserves in the line of forest entomology.

Mr. Sterrett spoke on "Methods and objects of establishing permanent sample plots." He asserted the necessity of sample plots to give more ample and reliable data by which to check up the discrepancies in silvicultural data obtained from various sources, the sample plots being established under a great variety of conditions, and observations and measurements being made under these varying conditions. The main divisions of the knowledge to be sought by sample plots are as follows: (1) growth and yield of stand, (2) natural reproduction of stand, (3) artificial reproduction of stand, (4) effects of thinning, (5) effects of fire, (6) effects of grazing, (7) growth of trees left after partial clearances, (8) light requirements, and (9) requirements as to soil and moisture.

Mr. Gaskill in New Jersey

Mr. Alfred Gaskill has been appointed Forester of the State Forestry Commission of New Jersey, and is already actively at work looking after the lands the State has acquired or proposes to acquire, and outlining a policy for work along educational and other lines. He reports a widespread interest in this work throughout the State, and has little doubt that there is a first-rate field in New Jersey.

A NEW CALIFORNIA OAK

(Quercus pricei)

BY

GEORGE B. SUDWORTH

PROBABLY no other group of Western trees has given the students of them so much perplexity as the oaks, of which the warm, sunny valleys and foothills of California possess at least sixteen species. They have been long and assiduously studied, both by field and herbarium workers. Those who have tried to compass them from herbarium specimens, with little or no knowledge of the trees as they grow, have described a number of species and varieties, which later were ruthlessly subordinated to synonymy by those to whom hard earned field knowledge seemed to give a wider view. Thus, a number of supposedly distinct western oaks have been judged forms only of variable and widely distributed species. It is not at all surprising, however, that the almost innumerable and apparently distinct leaf and fruit forms of some western oaks drove careful and conservative students to what seems like ultra species-making. It will probably be a long time hence before, exclusive of the still necessary juggling and rejuggling of some of the described but little known species, all of the Pacific oaks are discovered and given names, which, it may be said in parenthesis, is not an end in itself, but a means to an end—the making, as it were, of a convenient handle only for use in conducting real and profitable forest studies. And, furthermore, trying to define the natural limit of tree species and varieties for convenience sake is at best not so profitable and broadening as the larger study of how and why trees grow, and their relationship to human needs and progress. But in studying species nothing can help to know them so well as to see them in the field—to learn

how they look there with all their features assembled in one view. Several of the herbarium-made species of herbarium-made oaks have been found, under the light of field studies, to exist on different branches of the same tree.

The California oak presented here as new, is one of the biennial fruiting groups of live oaks, its nearest relative being Quercus wislizeni A. deC., which is the common live oak of the California Sierra and Coast Range foothills from Mt. Shasta to the southern part of the State. Little is known now of the range of this species, a few individuals of which were found by the writer in October, 1904, on the dry, gravely banks of a small tributary of the Nacimiento River in Monterey county. The trees were mingled with Quercus wislizeni and Quercus agrifolia, while in an adjacent, park-like valley grew the California valley oak, Quercus lobata, and nearby the blue oak, Quercus douglasi. The new oak was 25 to 30 feet high, and 8 to 12 inches in diameter, with blackish, very hard, roughly and irregularly broken bark at the base of the trunk; higher up, the bark was unbroken, smooth, and dark, ashy gray. The stems were straight, clear of branches for 8 to 10 feet, and with a narrow, dense crown of slender, tough, spreading branches. In general appearance this tree might easily be mistaken at a distance for Quercus wislizeni. The leaves, evergreen, and probably remaining on the trees for about two seasons before falling, are smooth throughout, thick, flat, a deep, shiny, yellow-green on their upper surfaces, and paler green beneath. The flowers are unknown. The acorns are matured in the autumn of the second season, immature fruit having been found on the season's smooth, red-brown twigs. Mature acorns (see fig. A), regarded as the most distinctive character of this oak, were invariably of the same form on all the trees seen. The tapering, pointed nut is smooth, somewhat lustrous, and dull, light brown; while the uniformly very shallow cups, on short stems, have smooth, pale brown scales. No opportunity was afforded for collecting or examining the wood, which it is judged should be closely similar to that of Quercus wislizeni.

Figure A.

It is probable that Quercus pricei has a wide range, at least in the coast hill region. Prof. Sargent has figured (Silva, Vol. VIII, Pl. CCCVI, fig. 6) an acorn of what he considers a form of Quercus wislizeni, but which, as nearly as can be judged, is the fruit of Quercus pricei. Prof. Sargent states that his shallow cupped form was found nowhere else but in Snow Creek Canyon, at the base of Mt. San Jacinto, which is probably 300 miles south of the Monterey County station. The trees noted by Prof. Sargent are smaller than the Monterey trees. A careful search will no doubt discover intervening stations, if not more or less continuous distribution of Quercus pricei between these two points.

It gives the writer great pleasure to name this sturdy oak in honor of Mr. Overton Westfeldt Price, who, as Associate Forester, has ably seconded the Forester in the heartiest encouragement of dendrological studies.

Mr. Kellogg's Lecture.

Mr. R. S. Kelllogg, of the Division of Products, Forest Service, left Washington on February 15, for a week's trip, to give lectures as follows:

University of Nebraska, February 18, two lectures to the forestry classes. Subjects: "Forest Products" and "Wood Utilization." One lecture to the short-course students in Agricultural Department. Subject: "Forestry." Quincy, Ill., February 19, illustrated address before the Illinois State Farmers' Institute. Subject: "Forest Planting in Illinois." Chicago, Ill., February 20, address before the Western Society of Engineers. Subject: "Some Problems in Wood Utilization in the United States." Cleveland, Ohio, February 21, address to the National Association of Box Manufacturers. Subject: "The Timber Supply of the United States."

Lumber Supply.

Three very striking points in regard to the question of lumber supply were brought out to-day in the address delivered by Mr. Royal S. Kellogg, of the United States Forest Service, before the meeting of the National Association of Box Manufacturers at Cleveland, on February 21, on "The Timber Supply of the United States." These were: The great inaccuracy of available estimates of timber stumpage, the tremendous drain which is being increasingly made upon forest resources, and the urgent need of securing reliable figures for the amount of timber still standing.

Mr. Kellogg drew attention to the most important estimates of standing timber, particularly the census returns in 1880 and in 1900, which he said were good in many respects, but at the same time were very insufficient and unsatisfactory for use to-day. In Mr. Kellogg's opinion "what is needed is an accurate determination of our forest resources based upon thousands of cruisings, or forest surveys. This is an immense piece of work, formidable more by its magnitude than by its difficulties. The machinery for it already largely exists in the Bureau of the Census and the Forest Service. Let Congress provide the means and give authority to do the work, and it can be accomplished easily. The opportune time is that of the next decennial census in 1910."

It was pointed out that there are three closely related questions that must be met before we will be in a condition to make the best use of our rapidly dwindling forest resources, and take steps to restore them; namely, how much timber have we? how fast is it growing? and how much is cut yearly? Illogical as it may seem, the first question will probably be answered last. The Forest Service has recently published a report on the forest products of the United States in 1905, and data upon the output of the forests in 1906 are now rapidly being collected by the Forest Service in cooperation with the Bureau of the Census. These annual reports will supply a sufficient answer to the third question.

How fast the standing commercial timber of the country is growing will soon be pretty fully known from the

figures upon the rate of growth which the Forest Service is gradually collecting and tabulating. Before long it will be possible to say what the annual increment should be in typical forests throughout the United States.

But nothing short of the suggested thorough system of forest surveys, Mr. Kellogg maintained, can yield reliable figures on the great question of supply, which is forcing itself upon every lumber manufacturer and owner of a wood-using factory. The estimate of 1880 was so wide of the mark that the actual cut in the case of white pine since that date has about doubled the estimated stumpage then. In Minnesota more than four times as much pine has been cut since 1880 as the State was estimated to have standing in that year, and yet Minnesota is today furnishing over one-third of the white pine cut in the United States.

"Despite these cheerful statements, however," said the speaker, "every box maker knows that the days of white pine are rapidly passing, and even accepting the most sanguine estimates of the present stumpage, it will in a few years cease to be a large factor in the lumber supply of the United States. The present annual cut is about three billion feet in the Lake States and one billion feet in the other states—less than half the cut in the Lake States alone in the latter eighties.

"The present annual cut of yellow pine is about twelve billion feet, or a little more than one-third the total cut of all species, and the maximum has probably not yet been reached. Whether we accept the lowest or the highest estimate of stumpage, it is evident that in ten or fifteen years there will be a most serious shortage or yellow pine."

The drain on other leading trees was emphasized by the speaker in similar fashion.

Some idea of the enormous quantity of lumber cut since 1880 is conveyed by saying that over seven hundred billion feet were cut, but such figures cannot really be grasped. This quantity of lumber would make a floor one inch thick over an area of 25,000 square miles, or more than 16,000,000 acres, equivalent to the combined area of the States of Vermont, Massachusetts, Connecticut, Rhode Island, and Delaware. Put in another way, this amount of lumber is equivalent to a plank 2 inches thick, 2 feet wide, and 33 million miles long, or 1,200 times the cirumference of the earth. It would supply a board-walk, a single 12-inch plank in width, reaching far beyond the sun.

The San Jacinto Nat. Forest Increased.

On February 14 the President, by proclamation, added largely to the San Jacinto Forest Reserve in the southern part of the Sierras of San Diego County, California, thus bringing the acreage of this reserve up to a total of 1,779,480 acres. The forest and chaparral on the added lands are of great importance in the regulation of water flow and as a protection to the lands needed for grazing, besides safeguarding the headwaters of streams highly valuable for irrigation. Protection of the watershed from over-grazing and fire, and the fact that the tract topographically belongs with the former San Jacinto Reserve, made advisable the extension of the oversight of the Forest Service to this region.

That portion of the San Jacinto Forest Reserve which extends southward into San Diego County will have an important bearing upon the destiny of a very interesting region. The climate along the coast in the vicinity of San Diego was said by Gen. A. W. Greeley, when he was Chief of the Signal Service, to be the most equable in the world, and the harbor of San Diego will increase in importance upon the opening of the Panama Canal. Immediately back of the city of San Diego are about 120,000 acres of land which can be irrigated; and such are the possibilities of soil, climate, and situation that the population might be easily increased to many times its present number provided that water could be obtained in sufficient quantities for irrigation and municipal use. It is a region of low precipitation, and the

Sweetwater dam, which was built a number of years ago and which has been considered a remarkable piece of engineering, would have safeguarded the people against one or possibly two very dry seasons were it not for the failure of the streams to fill this and other reservoirs.

A change has come over this country since the year 1769, when the Franciscan friars established the Mission of San Diego. At that time the San Diego River flowed into the "Good Port of San Diego," and was a large and permanent stream which alternated its discharge between False Bay and San Diego Harbor, sometimes leaving the mission without fresh water. These frequent changes of the river compelled the attention of the Federal Government, and in 1873 the discharge of the river was permanently confined to False Bay, and a dyke was constructed between Point Loma and the mainland to keep it in that position.

During recent years the water supply from over-grazed and repeatedly-burned watersheds has been insufficient to supply the streams, with the result there has been a serious shortage of water, which threatened at one time to depopulate the country. Recently, however, the rainfall has been above the normal and the reservoirs which are constructed have a supply which will last at least two years. Other reservoirs are under construction or soon will be, and it is confidently expected that the total of nine large reservoirs with watersheds protected and improved by the Federal Government will enable western San Deigo County to support the large population to which it is naturally entitled.

While the reserve contains a large amount of valuable timber which is partly in the hands of private owners, who, it is hoped, will co-operate with the Government, the administration of this reserve will present some of the most important problems with which the Forest Service has to deal. It is expected when the burning of brush and trees is permanently prevented and nursery sites are established for the extension of the forest and also to encourage private owners in the practice of forestry, that the increase in water supply will more than pay for the amount which must be expended by the Government to protect this area. The maximum rainfall is about 42 inches, and the average for the entire area is about 20 inches. It would seem from this that water should be abundant, but the evaporation from the denuded watersheds has been so excessive that a living stream is very rare.

Timber Testing. In the past the timber testing work of the Forest Service has been conducted in each laboratory largely without regard to the others. In order to correlate the work, a central office has been established in Washington, with two engineers and suitable assistance. This office will keep complete files of all timber test data, and carry on general studies.

Free Use. The annual reports on the free use business of the forest reserves show that in round numbers $75,000 worth of material has been granted to 15,000 permittees. The Wenaha Reserve in eastern Washington and Oregon leads, with a total valuation of over $5,000. The Henry's Lake, Weiser, and Bear River reserves each granted over $3,500 worth of material. The minimum amount in any one reserve was about $5. Naturally the reserves situated in the heavily timbered parts of Oregon and Washington have had the fewest applications for such privileges, and the ones which have handled the largest number of free-use permits are those in eastern Washington, southern Idaho, Colorado, and Utah. In the Southwest there are very few reserves which have granted over $1,000 worth of material, although in most of them the free use privilege was of great importance to the settlers living near the reserves.

Planting Work. A conference of the men in charge of reserve planting stations was held from February 15 to March 28. All the details of nursery practice and field planting were taken up, and ideas were exchanged as to the methods adapted to the various lines of work.

Field planting in the reserves of southern California has been finished for the season. Nearly 180,000 seedlings have been planted in the mountains; for this work the conditions are very favorable, since the rainfall has been unusually heavy. About 60,000 trees were set by the rangers, and the possibilities of enlarging this work by means of planting by the rangers are very great.

The spring planting operations have begun in the Gila Reserve. The cooperative planting of cottonwood cuttings on the military reservation is practically completed; and 2,000 western yellow pine have also been set out.

On the Cameron Creek watershed within the reserve 10,000 trees are being planted experimentally. As the rainy season begins in July, there is a plan to harden a few thousand seedlings by reducing their water supply, and then set these in the field in the late summer. The Fort Bayard nursery will furnish seedlings for experimental setting on several other reserves in the Southwest.

Soil Tests of Free Seeds. Practical soil tests of tree seeds, to learn the germinative power of the various kinds, are being made by the Forest Service in one of the greenhouses belonging to the Bureau of Plant Industry. Nearly all the tree seeds that are used in commercial quantities in forest reserve nurseries will be covered by these experiments. Almost nothing is known of the germinative energy of these seeds; and although greenhouse tests, even in soil, are bound to give a better showing for the seeds than open air nurseries, yet there will be sufficient data obtained to show how thickly the seed should be planted in the nurseries.

The Strawberry Tunnel Authority has been granted the Supervising Engineer of the Strawberry Valley project, Utah, to obtain proposals from as many firms as may be practicable for the machinery required for the power plant to be used in excavating the Strawberry tunnel. It is estimated that the machinery required will cost approximately $100,000. The general plan which has been worked out by the engineers is to erect a power plant at the point where the Strawberry Valley tunnel water is dropped into the Salem canal, utilizing a fall of 120 feet, and the minimum amount of water which flows into Spanish Fork about 60 cubic feet per second. This power is to be utilized for furnishing power to the Strawberry tunnel until it is finished, and in furnishing light and possibly small quantities of power to the towns in the neighborhood of the power plant, which are all within a radius of 12 or 15 miles.

The estimates indicate that there will be an excess of 100 horse power to

dispose of for this purpose. The total power generated and available with this quantity of water and fall will be about 800 electrical horse power, of which probably 400 will be required to carry on the construction of the Strawberry Valley tunnel.

Authority has already been granted for the construction of about 3 miles of canal, which will carry the waters of the Strawberry tunnel, as well as the waters of Spanish Fork, to the power house.

The Hondo Reservoir

As the Hondo Reservoir in New Mexico was not completed in time to receive the full flood discharge of Hondo River, the settlers have requested that the project be not declared open this year, but that the members of the Water Users' Association be permitted to buy such water as may be required; precedence in purchasing to be given to those whose lands are already in cultivation. In view of the action taken by the Secretary of the Interior in the Carlsbad project, which in many respects involves similar conditions, the Supervising Engineer has been directed to provide for the sale of water to the settlers on the Hondo project for the season of 1907.

The Willow Dam

Northwestern contractors are offered an excellent opportunity to bid on Government work by the Reclamation Service which is now soliciting proposals for the construction of an earth-filled dam and accessory structures located on Willow Creek, about 5 miles northwest of Augusta, Montana. This work is in connection with the Sun River project for the irrigation of lands near Great Falls. It involves about 7,500 cubic yards of open cut excavation; 170,000 cubic yards of embankment; 620 linear feet of lined outlet tunnel, and 130 cubic yards of reinforced concrete. Bids will be received until March 15, 1907, at the office of the United States Reclamation Service, Great Falls, Montana, and particulars may be obtained by addressing the engineer at that place.

The Sun River Project

The Secretary of the Interior is soliciting proposals for the construction of 12 miles of main canal, 67 miles of laterals, 17 miles of waste water ditches and appurtenant structures in connection with the Sun River irrigation project, near Great Falls, Montana.

The work involves approximately 481,000 cubic yards of excavation, 1,200 cubic yards of concrete, 900 cubic yards of paving and rip rap, 290,000 feet board measure of lumber, the placing of 182,000 pounds of steel, and the furnishing of such other material and the performance of such other work as may be necessary for the completion of the work.

The bids will be opened at Great Falls, Montana, on April 3, 1907. Detailed information may be obtained at the office of the Reclamation Service, Washington, D. C., or from the project engineer at Great Falls, Montana.

The Keno Canal

Contractors are asked to bid on the work of excavating the Keno canal, near Klamath Falls, Klamath irrigation project, Oregon, involving about 80,000 cubic yards of rock and earth excavation.

The plans, specifications and forms of proposal may be obtained by application to the Supervising Engineer, U. S. Reclamation Service, Portland, Oregon, or the project engineer, Klamath Falls, Oregon.

In connection with the construction of the Keno canal, Klamath irrigation project, the Secretary of the Interior has authorized a portion of the work to be done by force account. The estimated cost of this part of the work is about $19,000, and it is proposed by the Reclamation Service to divide it into small schedules so that local contractors can bid on the work. This has been deemed advisable owing to the necessity for delivering water by October 1, 1907.

Proposals are being solicited for the construction of the Keno canal in connection with the Klamath irrigation

project, Oregon-California. The work will involve the excavation of about 80,000 cubic yards of rock and earth. The bids will be opened at Portland, Oregon, April 15, 1907. Contractors should address the Supervising Engineer of the Reclamation Service at Portland, Oregon, for particulars.

The Colorado Break

A telegram received on February 15 by the Reclamation Service from the engineers on the Lower Colorado River in Mexico, reports the successful closing of the break in the bank. After a mighty struggle with this unruly stream in which all the energy of 1,000 men, supplied with the equipment of the Southern Pacific Railroad, has been employed for weeks, the Colorado has been controlled and once more is proceeding on its way to the Gulf of California.

A determined effort is being made to fortify the break by constructing many miles of levees. The problem from now on will be to preserve these levees from destruction during the period of floods.

The Belle Fourche Project

Mr. Charles E. Wells, Supervising Engineer for the Belle Fourche irrigation project, South Dakota, and the North Platte project, Nebraska-Wyoming, who is in Washington for a few days on business connected with his work, says:

"The division dam at Belle Fourche is nearly completed, and it is expected that it will be finished in time to use for irrigation the coming season. Work is being prosecuted on the Belle Fourche dam, which is an earth structure about 1¼ miles long and 100 feet in height, and which creates a reservoir covering between eight and two thousand acres.

"About 17 miles of main canal under construction will probably be finished next season. Specifications have been prepared for the construction of Sections 2 to 8 of the South canal and appurtenant structures, involving approximately 900,000 cubic yards of canal excavation, 7,200 cubic yards of concrete, and 1,295 linear feet of tunnel.

"It will not be possible to use the Belle Fourche dam for impounding water the present season, but a temporary canal has been constructed so that it will be possible to irrigate a considerable acreage under the project by means of this canal. It is expected that by the season of 1908 the Belle Fourche dam will be so far advanced in construction that it may be used for impounding water in the reservoir and that water will be distributed through the North and South canals to the lands under them. Much of the land under the project has been settled upon and a desirable class of settlers is preparing to make homes there."

The Secretary of the Interior has granted an extension of time to Orman & Crook, of Pueblo, Colorado, for completing the work of Schedule 3, South canal, Belle Fourche irrigation project, South Dakota, to June 1, 1907.

The delay in the work which made this extension necessary was caused by the severity of the weather.

The North Platte Project

Speaking of the North Platte project, Mr. Wells says:

"We were obliged to close down the masonry work on the Pathfinder dam about the middle of November on account of freezing weather, but the contractors are continuing work through the winter at the quarry and spillway, excavating stone which will be used next season on the masonry work on the dam. A large force of teams is also employed hauling cement from Casper to the dam site, a distance of about 50 miles. At present about 10,000 barrels of cement are stored at the dam site, and it is expected that the work of laying masonry will begin early in the spring and be prosecuted with vigor before the floods occur in May and June, during which time work will have to be suspended.

"The floods usually last until early in July, when the waters in the North Platte River subside. The working

season will then last until probably about the middle of November. It is expected that the bulk of the work on the dam will be done the present season and that the dam will be completed by the contractors before November, 1908.

"Advertisements are out containing specifications for the construction of the Pathfinder dike, and bids will be opened for this work February 27. The dike is an earth structure reinforced with rock on the water side, and is constructed for the purpose of supplementing the Pathfinder dam. On the south side of the dam is a low place which requires to be filled, and the dike is constructed for the purpose of preventing the water running through this place. It will be about a quarter of a mile long and about 35 feet high at the highest point. It is expected that contracts will be let soon after the opening of bids, and that the dike will be completed by 1908.

"The contract for the high pressure gates which are to control the flow of water from the Pathfinder dam has already been awarded, and the gates will be placed in position before March 1, 1908.

"About 150 miles down the river from the Pathfinder dam the Whalen dam will divert the waters into the Interstate canal. Bids for this dam were received January 9, and the contract probably will be awarded within a very few days.

"Forty-five miles of the Interstate canal were completed last season, and considerable land will be placed under irrigation from the finished portion of the canal this season. Fifty miles more are under construction and will probably be finished early the coming summer. One hundred and thirty-five miles of laterals are also under construction, and during the season of 1908 a large amount of land under the Interstate canal will be ready for irrigation."

The Secretary of the Interior has awarded contract to the S. R. H. Robinson & Son Contracting Co., of St. Louis, Mo., for the construction of a diversion dam and headworks, North Platte irrigation project, Wyoming-Nebraska, at a total price of $217,850.

This dam, known as the Whalen dam, is situated about 150 miles down the river from the Pathfinder dam, its purpose being to divert the water into the Interstate canal. Its construction involves the excavation of about 90,000 cubic yards of earth and rock, the furnishing and placing in structures about 10,000 feet board measure of lumber, and the construction of about 8,000 cubic yards of concrete masonry.

The Reclamation Service has been authorized to purchase informally from the lowest bidder, cost of transportation considered, 5,000 barrels of Portland cement for use on the Interstate canal, North Platte irrigation project, Nebraska-Wyoming.

Contracts

The Secretary of the Interior is advertising for prosposals to furnish 55,000 barrels of Portland cement, f. o. b. cars at mill, for use in connection with the following irrigation projects: Shoshone, Wyoming; Williston and Buford-Trenton, North Dakota; Huntley, Montana, and North Platte, Wyoming-Nebraska.

The bids will be opened at Huntley, Montana, March 12, 1907. Detailed information may be obtained upon application to the Supervising Engineer, Huntley, Montana, or the Supervising Engineer, Crawford, Nebraska.

The New Jersey Foundry & Machine Co., of New York City, has been awarded contract for furnishing high pressure gates for the Shoshone and Pathfinder dams, Wyoming, at the price of $123,500.

The *Canadian Forestry Journal* for December is a very interesting number. Besides an account of the proceedings of the Canadian Forestry Convention, held in Vancouver last September, at which the Associate Forester of the United States Department of Agriculture, Mr. Overton W. Price, was present, there are several articles of interest alike to the forests and the layman, from two of which we quote.

In an article on "Tree Planting and Nursery Work at Indian Head," Mr. Norman H. Rose gives some suggestive figures on growing cottonwood for fuel. Some of these trees were planted 3 or 4 years ago as seedlings 1½ feet high; last fall the trees, before being cut down, averaged 15 feet in height, and many were over 6 inches in diameter at the ground. "There is not the least doubt," he says, "as to the possibility of growing fairly good fuel within six or eight years, when cottonwood or willow are used, and when trees are properly set out and cared for."

In an article entitled, "The Dominion Forest Reserves in the Dry Belt in British Columbia," the author, Mr. Roland D. Craig, describes conditions resembling very closely those found in some of our Western States. He says: "The chief function of these reserves is to protect the watershed from which flow the streams which are turning a land resembling the Majara Desert into a region of fruitful valleys. The great possibilities of these fertile valleys when watered are just beginning to be appreciated, and anything which assists irrigation cannot easily be over-valued. It has been demonstrated that by irrigation $300 to $500 per acre per annum can be secured in fruit, and now settlers are pouring into the valleys with the intention of entering this profitable business. The profit and permanence of this industry is, however, directly dependent on the preservation of the forests on the mountains surrounding the valleys, for in the valleys there is very little precipitation * * * and irrigation must be depended upon. At higher altitudes the precipitation, both in snow and rain, greatly increases; and, if protected and controlled, there is an ample supply of water for the land which is available for agriculture."

J. S. H.

Circular No. 82, Bureau of Entomology. Pinhole Injury to Girdled Cypress in the South Atlantic and Gulf States, by A. D. Hopkins.

Dr. Hopkins here gives the results of investigations carried on in several Southern States in 1903 and 1904. He lays stress on the fact that "certain types and varieties of trees of the same species are more resistant or immune to their insect enemies, while others are more attractive to them." It is recommended that, in order to guard as much as possible against insect injury, the girdling of cypress trees be done either in March, April, October, or November. But the number of trees under investigation was small in comparison with the variety of conditions under which the experiments were made, and it would seem that further investigation by lumbermen or others would be of great use in confirming these conclusions.

Report of the Division of Forestry, Territory of Hawaii, for the year ending December 31, 1905. (Reprint from the second report of the Board of Commissioners of Agriculture and Forestry, Territory of Hawaii.)

The report of the Division of Forestry of the Territory of Hawaii for 1905 indicates continued activity in the reservation of forest lands and in the institution of forest protection measures. Out of 248,807 acres recommended to be reserved, 68,901 acres in seven reserves had been actually set aside, and the withdrawal of other large areas was contemplated. Forest protection on these lands is provided by a fire law patterned after that of California, and an organization of district fire wardens, whose efficiency is, however, handicapped by a meagre appropriation for fire-fighting. The report contains brief but interesting notes on forest utilization and extension in the islands.

E. H. F.

"California Plants," a new work on California botany by Charles Russel Orcutt, is announced in the December number of **Arboriculture.**

J. S. H.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., February 20, 1907. Sealed proposals will be received at the office of the Engineer, United States Reclamation Service, Huntley, Montana, until 2 o'clock, p. m., April 17, 1907, for the construction of structures on Garland Canal and Laterals near Ralston, Shoshone project, Wyoming, involving about 47,000 cubic yards of grading, 5,000 cubic yards of concrete, the placing of 348,000 pounds of steel reinforcing bars and other incidental work. Particulars may be obtained from the Chief Engineer of the United States Reclamation Service, Washington, D. C., the Supervising Engineer, Huntley, Montana, or the Engineer, Cody, Wyoming. E. A. HITCHCOCK Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., February 14, 1907. Sealed proposals will be received at the office of the United States Reclamation Service, Belle Fourche, South Dakota, until 3 o'clock, p. m., April 10, 1907, for the construction of sections 2 to 8 of the South Canal with appurtenant structures, involving approximately 900,000 cubic yards of canal excavation, 7,200 cubic yards of concrete and 1,295 linear feet of tunnel, in connection with the Belle Fourche Project, South Dakota.

Plans, specifications and proposal blanks may be obtained from the United States Reclamation Service, Washington, D. C., Crawford, Nebraska, or Belle Fourche, South Dakota. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., January 8, 1907. Sealed proposals will be received at the office of the United States Reclamation Service, Huntley, Montana, until 10 o'clock a. m., March 12, 1907, for the construction of about 185 miles of canals, ranging in capacity from 5 to 1,000 cubic feet per second, involving approximately 900,000 cubic yards of excavation, and doing such other work as may be necessary for the completion of the canals. Particulars may be obtained by application to the U. S. Reclamation Service, Washington, D. C., or to the U. S. Reclamation Service, Cody, Wyoming. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., January 4, 1907. Sealed proposals will be received at the office of the United States Reclamation Service, Williston, North Dakota, until 10 o'clock a. m., March 5, 1907, for the construction of canals and ditches, involving the excavation of about 420,000 cubic yards of earth, and furnishing labor and material for a pumping station and various structures requiring about 120,000 feet B. M. of lumber, about 1,300 cubic yards of concrete, and 10,000 pounds of structural steel, in connection with the Buford-Trenton project. Plans, specification and proposal blanks may be obtained from the Chief Engineer, United States Reclamation Service, Washington, D. C., or from H. A. Storrs, Electrical Engineer, Williston, North Dakota. E. A. HITCHCOCK, Secy.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., February 2, 1907. Sealed proposals will be received at office of the United States Reclamation Service, Great Falls, Montana, until 2 o'clock, p. m., March 15, 1907, for constructing an earth fill dam and accessory structures, located on Willow Creek, about five miles northwest of Augusta, Montana, and involving about 7,500 cubic yards of open cut excavation, 170,000 cubic yards of embankment, 620 linear feet of lined outlet tunnel, and 130 cubic yards of reinforced concrete. Particulars may be obtained from the Chief Engineer of the Reclamation Service, Munsey building, Washington, D. C., the Supervising Engineer, Huntley, Montana, or the Engineer, Great Falls, Montana. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., February 6, 1907. Sealed proposals will be received at the office of the United States Reclamation Service, Great Falls, Montana, until 2 o'clock p. m., April 3, 1907, for the construction of 12 miles of main canal, 67 miles of laterals, and 17 miles of waste water ditches, near Great Falls, Montana, and appurtenant structures, involving approximately 481,000 cubic yards of excavation, 1,200 cubic yards of concrete, 900 cubic yards of paving and riprap, 290,000 feet B. M. of lumber, the placing of 182,000 pounds of steel, and the furnishing of such other material and the performance of such other work as may be necessary for the completion of the work.

Plans, specifications and proposal blanks may be obtained from the United States Reclamation Service, Washington, D. C., or from the United States Reclamation Service, Great Falls, Montana. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., February 12, 1907. Sealed proposals will be received at the office of the United States Reclamation Service, Portland, Oregon, until 2 o'clock p. m., April 15, 1907, for the excavation of the Keno Canal, near Klamath Falls, Klamath project, Oregon-California, involving about 80,000 cubic yards of earth and rock excavation.

Plans, specifications and forms of proposal may be obtained by application to the Chief Engineer of the United States Reclamation Service, Washington, D. C., the Supervising Engineer, 307 Tilford building, Portland, Oregon, or the Project Engineer, Klamath Falls, Oregon. E. A. HITCHCOCK, Secretary.

The . . **PAPER** . . that this publication is printed on is furnished by

R. P. Andrews Paper Co., Inc., Washington,

Sole Agents in the District of Columbia for the

West Virginia Pulp and Paper Company,

the Largest Manufacturers of Book Paper in the world.

IF IN NEED, DROP THEM A LINE

"8vo, xiv+458 pages, Cloth $4.00."

Forest Mensuration

By HENRY SOLON GRAVES, M.A.
Director of the Forest School, Yale University

CONTENTS.—Introduction. The Determination of the Contents of Logs. Detailed Discussion of Log Rules. Log Rules Based on Standards. Methods of Scaling Logs. Determination of Contents of Round Logs in Cubic Feet. Determination of the Cubic Contents of Squared Logs. Cord Measure. The Contents of of Entire Felled Trees. The Measurement of the Height of Standing Trees. Determination of the Contents of Standing Trees. The Use of Form Factors. Volume Tables. Determination of the Contents of Stands. The Method of the U. S. Forest Service. Determination of the Volume of Stands by Sample Plots. Determination of the Ageof Trees and. Stands. The Growth of Trees and Stands The Study of Diameter Growth. The Study of Areal Growth. The Study of Height Growth. The Study of Volume Growth. Volume Growth of Stands. Growth in Weight. Yield Tables for Even-aged Stands. Yield Tables for Uneven-aged Stands. Appendix.

JOHN WILEY & SONS
43 and 45 East 19th St. New York City

AMERICAN TREE SEEDS

IMPORTANT TO FORESTERS

We have in stock now and for prompt delivery, while supply holds out, SEED of new crops in best quality of

White Pine, Austrian Pine,
Corsican Pine. Swiss Mountain Pine,
Swiss Stone Pine, Scotch Pine.
Pitch Pine, Sugar Pine,
etc., etc., further
European Larch from Tyrol
Norway Spruce from Silesia
Simon Pure Catalpa Speciosa
Honey Locust, etc., etc.

If in need of any of above articles state your requirements at once and we shall quote very attractive prices. Also, let ussend you our DESCRIPTIVE Catalogue of Tree Seeds. It will interest you.

OTTO KATZENSTEIN & CO.
68 S. Pryor Street, - - Atlanta, Ga.

Cloudy or hazy weather will not prevent the use of the Young Solar Transit—but of no other Solar is this true.

Illustrated Catalogue upon application

YOUNG & SONS, PHILADELPHIA

Niagara Hydraulic Engine

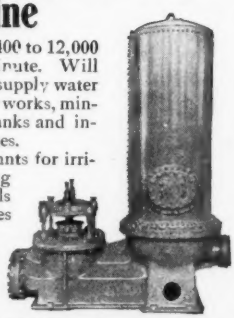
Using from 2 to 350 gallons per minute. Elevating 35 feet for each foot-fall.

Niagara Hydrokinetic Engine

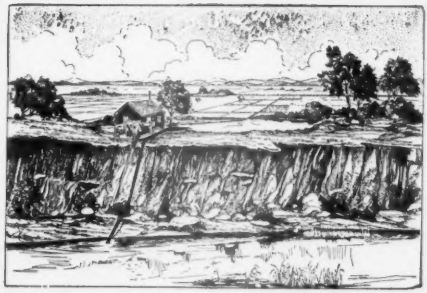
Using from 400 to 12,000 gallons per minute. Will automatically supply water for town water works, mining, railroad tanks and industrial purposes.

Complete plants for irrigation, utilizing as power, falls from 18 inches to 50 feet.

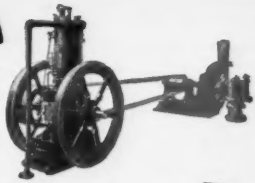
Write for catalogue A and guaranteed estimate.



NIAGARA HYDRAULIC ENGINE CO.,
140 Nassau Street, New York



Make Your LAND Productive



The value of arid land can often be increased from $1.00 to $100 or even $500 an acre by the use of Fairbanks-Morse Mechanical Irrigation Machinery. Send for our new illustrated pamphlet, Practical Irrigation, No. 649 P. I.

Fairbanks, Morse & Co.

Chicago, Illinois

I Can Sell Your Real Estate or Business

NO MATTER WHERE LOCATED

Properties and Business of all kinds sold quickly for cash in all parts of the United States. Don't wait. Write today describing what you have to sell and give cash price on same.

If You Want to Buy

any kind of business or Real Estate anywhere, at any price, write me your requirements. I can save you time and money.

DAVID P. TAFF,

THE LAND MAN,

415 KANSAS AVENUE,

TOPEKA, KANSAS.

Rife Hydraulic Ram

(Pumps Water by Water Power)

Town Water Works,
Railroad Tanks, Irrigation,
Country Homes, Greenhouses.

No Attention—No Expense—Runs Continuously.

Operates under 18 inches to 50 feet fall. Elevates water 30 feet each foot of fall. 5000 in successful operation. Sold on 30 days trial. Catalog and estimate free.

RIFE HYDRAULIC RAM COMPANY,

2172 Trinity Bldg., New York.

The Popular Science Monthly

CONTENTS OF JULY NUMBER

The Relations of Embryology to Medical Progress. Professor CHARLES SEDGWICK MINOT.

The Largest American Collection of Meteorites. L. P. GRATACAP.

The Plane of Ether. President DAVID STARR JORDAN.

Are the Elements Transmutable, the Atoms Divisible and Forms of Matter but Modes of Motions? Professor S. LAWRENCE BIGELOW.

Pure Food Legislation. ROBERT McD. ALLEN.

Wooden Flowers. Dr. ORVILLE PAUL PHILLIPS.

The Geological Prelude to the San Francisco Earthquake. GEORGE H. ASHLEY.

Our Greatest Earthquakes. MYRON LESLIE FULLER

Shorter Articles:
The Typhoid Fever Epidemic at Palo Alto. EDITH V. MATZKE.

The Progress of Science:
The American Association for the Advancement of Science; The Boston Meeting of the American Medical Association; The New Harvard Medical School; Mr. Adams on the American College; The Causes of Death; Scientific Items.

CONTENTS OF AUGUST NUMBER

The Investigation of the San Francisco Earthquake. G. K. GILBERT.

Seismograph and Magnetograph Records of the San Francisco Earthquake. Dr. L. A. BAUER.

Reminiscences of Yukon Exploration. WILLIAM HEALEY DALL.

Fact and Fable in Animal Psychology. Professor JOSEPH JASTROW.

The World State, Professor C. C. ECKHARDT.

The Measure of Progress. Dr. EDWARD S. HOLDEN

The Effects of Immigration on Homicide in American Cities. MAYNARD SHIPLEY.

The Study of Variable Stars. Professor SOLON I. BAILEY.

The Progress of Science
Cornell University and the Summer Meeting of the American Association; Legislation and Science; Scientific Items.

THE POPULAR SCIENCE MONTHLY will be sent for six months for one dollar to new subscribers mentioning FORESTRY AND IRRIGATION

Single Numbers, 30 Cents. Yearly Subscriptions, $3.00

THE SCIENCE PRESS, Sub-Station 84, New York

Thorburn's Seeds

ABSOLUTELY the best there are — unequalled for purity and germination, and no more expensive than others.

If you have not already received our CATALOGUE, send for it now. IT COSTS YOU NOTHING.

J. M. Thorburn & Co.

33 Barclay Street,
Through to 38 Park Place
Established 1802 **NEW YORK**

Biltmore Forest School

Biltmore, N. C.

Theoretical and practical instruction in all branches of applied forestry.

Course comprising twelve consecutive months can be entered at any time of the year—no vacations.

Object lessons within the mountain estate of George W. Vanderbilt, comprising 120,000 acres, where forestry has been practiced since 1895

For further information apply to

C. A. Schenck, Director

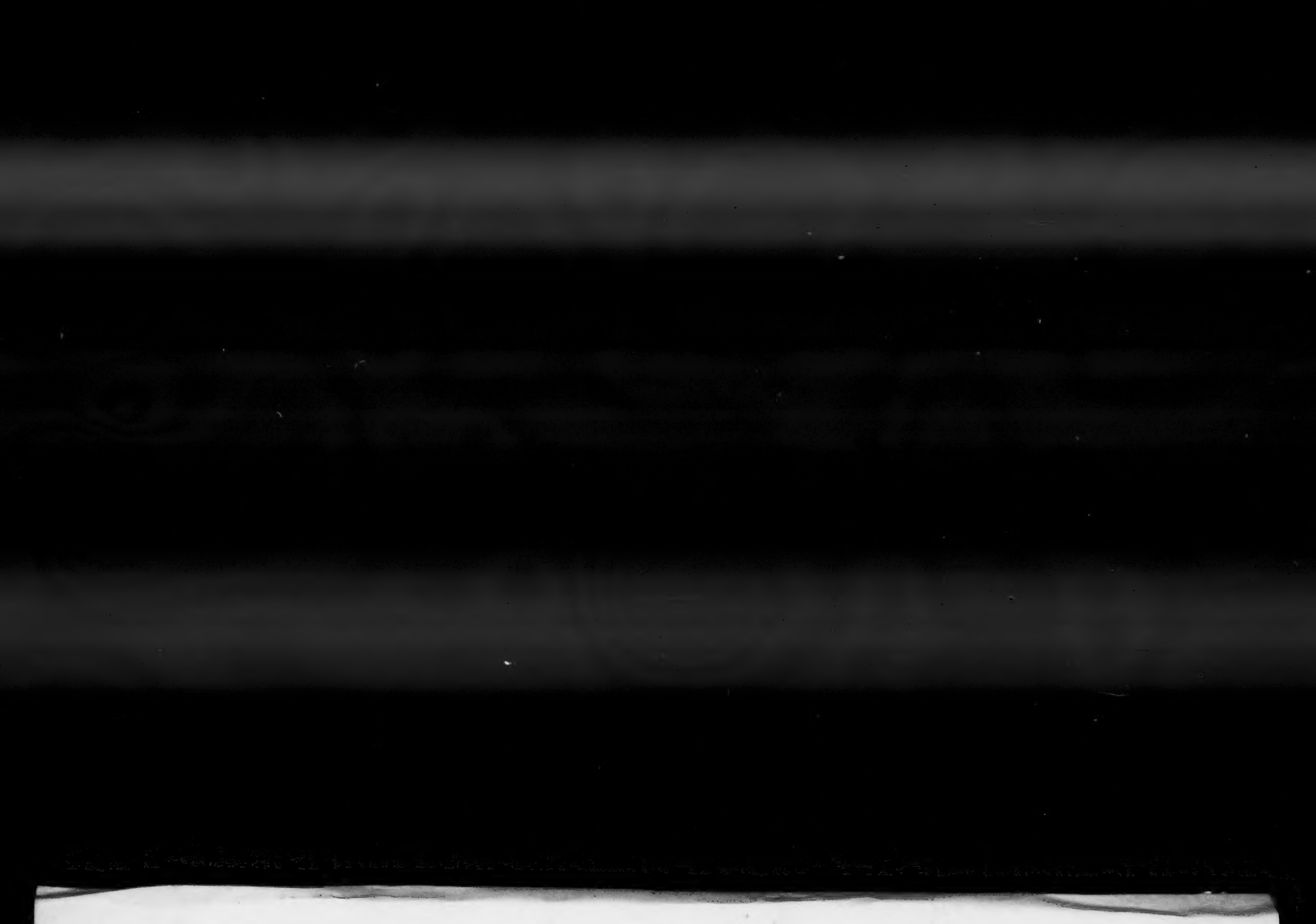
YALE FOREST SCHOOL

NEW HAVEN . . CONNECTICUT

The course of study in THE YALE FOREST SCHOOL covers a period of two years. Graduates of collegiate institutions of high standing are admitted as candidates for the degree of Master of Forestry.

The Summer School of Forestry is conducted at Milford, Pike County, Penna.

For further information address

Henry S. Graves, Director, New Haven, Conn.

SUDWARTH PRINTING COMPANY, WASHINGTON, D. C